Discussion Forum Assignment

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Discussion Forum Assignment

by Pramila Bajpai (Instructor) - Wednesday, 15 November 2023, 10:14 PM

In this unit, you have learned about the fundamental concepts of set theory, operations, and mathematical notations. Before you start with the discussion assignment, you need to know the importance of set theory in the real world to help you build upon this knowledge. Here is an example that will help you understand its importance:

Consider a grocery store where customers can purchase items from a wide range of categories like fruits, vegetables, dairy, bakery, etc. The store wants to analyze the purchasing behavior of its customers and determine the most popular items in each category. They can use set theory to create sets of customers who purchase items from each category and then find the intersection of these sets to determine which customers purchase items from multiple categories.

Now, engage in a discussion with your peers by completing the following task and posting it in the discussion forum:

Create three sets A, B having 4 elements in each, and U, a Universal set of any possible number of elements of your interest. (For example, you can consider the sets A = {a, b, c, d}, B = {1, 2, 3, 4} and U = {a, b, c, d, 1, 2, 3, 4, apples, mangoes, avocados}.

Note: Do not use the same examples. Create your own sets by changing the numbers and letters.)

Then explain the answers to the following questions to your peers:

i. $A \cup B$

ii. $A \cap B$

iii. $(A \cap B) \cup U$

iv. The Power set of A.

v. A’

vi. $\emptyset \cap B$

vii. $A \times B$

viii. A-B

ix. $(A - B) \cup (B - A)$

x. Prove any one De Morgan identity for A and B.

Your Discussion should be a minimum of 200 words in length.

Use APA citations and references for the textbook and any other sources used; refer to the UoPeople APA Tutorials in the LRC for help with APA.

320 words

Permalink

Re: Discussion Forum Assignment

by Nkhumeleni Tshivhase - Wednesday, 22 November 2023, 11:55 PM

Hi Nhat,

This is a well written response which covers all aspects of the question. Well done on your response.

20 words

Rate: Rate...

Permalink Show parent

Re: Discussion Forum Assignment

by Nkhumeleni Tshivhase - Wednesday, 22 November 2023, 11:48 PM

Let A = {2, 4, 6, 8}, B = {1, 3, 5, 7}, and U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}.

A ∪ B (Union of A and B): This is the set of all elements that are in A or in B or in both.

- A ∪ B={1,2,3,4,5,6,7,8}
-

A ∩ B (Intersection of A and B): This is the set of all elements that are common to both A and B.

-
- A ∩ B={ } (there are no common elements between the two sets)
-

(A ∩ B) ∪ U (Union of the intersection of A and B with U): This is the set of all elements that are in the intersection of A and B or in U.

-
- (A ∩ B) ∪ U ={1,2,3,4,5,6,7,8,9,10}
-

Power set of A: The power set of a set is the set of all its subsets.

- P(A) = {{},{2},{4},{6},{8},{2,4},{2,6},{2,8},{4,6},{4,8},{6,8},{2,4,6},{2,4,8},{2,6,8},{4,6,8},{2,4,6,8}}
-

A′ (Complement of A): This is the set of all elements in U that are not in A.

- A′={1,3,5,7,9,10}A′={1,3,5,7,9,10}
-

∅ ∩ B (Intersection of the empty set with B):

- This is an empty set, as there are no elements common to the empty set and B.
-

A×B (Cartesian product of A and B): This is the set of all possible ordered pairs where the first element is from A and the second element is from B.

- A×B = {(2,1),(2,3),(2,5),(2,7),(4,1),(4,3),(4,5),(4,7),(6,1),(6,3),(6,5),(6,7),(8,1),(8,3),(8,5),(8,7)}

A−B (Set difference of A and B): This is the set of all elements in A that are not in B.

- A−B={2,4,6,8}
-

(A−B) ∪ (B−A) (Union of the set difference of A and B with the set difference of B and A): This is the set of all elements that are in A but not in B, or in B but not in A.

- (A−B) ∪ (B−A)={1,2,3,4,5,6,7,8}
-

Prove De Morgan's Law for Union: De Morgan's Law states that the complement of the union of two sets is equal to the intersection of their complements.

-
- A′ ∪ B′ = (A ∩ B)′

- The left side is the set of elements not in A or not in B. The right side is the set of elements that are not in the intersection of A and B. Both represent elements that are not in A and not in B, so the statement holds true.

380 words

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Re: Discussion Forum Assignment
by Luc Bitsy - Wednesday, 22 November 2023, 11:40 PM

I appreciate your comprehensive responses to the questions on sets. Your examples and explanations make it easy to follow your thought process, and it is evident that you have a solid grasp of the topic. Keep up the excellent work!
40 words

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Re: Discussion Forum Assignment
by Luc Bitsy - Wednesday, 22 November 2023, 11:38 PM

Well done on addressing each question with clarity and providing logical explanations for your answers. Your response shows a systematic approach to problem-solving and attention to detail.
27 words

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Re: Discussion Forum Assignment
by Nhat Nguyen - Wednesday, 22 November 2023, 11:37 PM

MATH 1302-01 Discrete Mathematics - AY2024-T2
Unit 1: Set Theory and Basics of Counting
Discussion Forum Unit 1

Supposed sets A, B, and C as below:

A = {1, 2, x, y}

B = {x, y, z, 3}

U = {1, 2, x, y, z, 3, apple, banana, orange}

i. $A \cup B$ (Union of A and B):

$$A \cup B = \{1, 2, x, y, z, 3\}$$

ii. $A \cap B$ (Intersection of A and B):

$$A \cap B = \{x, y\}$$

iii. $(A \cap B) \cup U$ (Union of intersection of A and B with U):

$$(A \cap B) \cup U = \{1, 2, x, y, z, 3, apple, banana, orange\}$$

iv. Power set of A:

The power set of A is the set of all subsets of A, including the empty set and A itself.

$$P(A) = \{\{\}, \{1\}, \{2\}, \{x\}, \{y\}, \{1, 2\}, \{1, x\}, \{1, y\}, \{2, x\}, \{2, y\}, \{x, y\}, \{1, 2, x\}, \{1, 2, y\}, \{1, x, y\}, \{2, x, y$$

v. A' (Complement of A):

The complement of A with respect to U is $A' = \{z, 3, apple, banana, orange\}$

vi. $\emptyset \cap B$ (Intersection of the empty set with B):

$\emptyset \cap B = \emptyset$ (Empty set)

vii. $A \times B$ (Cartesian product of A and B):

$A \times B = \{(1, x), (1, y), (1, z), (1, 3), (2, x), (2, y), (2, z), (2, 3), (x, x), (x, y), (x, z), (x, 3), (y, x), (y, y), (y, z), (y,$

viii. $A - B$ (Set difference of A and B):

$A - B = \{1, 2\}$

ix. $(A - B) \cup (B - A)$:

$(A - B) \cup (B - A) = \{1, 2, z, 3\}$

x. De Morgan's Law:

One of the De Morgan's laws states that the complement of the union of two sets is equal to the intersection of their complements.

$(A \cup B)' = A' \cap B'$

In our example,

$(A \cup B)' = \{z, 3, apple, banana, orange\} = A' \cap B' = \{z, 3, apple, banana, orange\}$

351 words

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Re: Discussion Forum Assignment

by Luc Bitsy - Wednesday, 22 November 2023, 11:37 PM

Excellent job in providing thorough and precise answers to all ten questions related to sets. Your response demonstrates a strong understanding of the concepts and the ability to articulate your thoughts effectively.

32 words

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Re: Discussion Forum Assignment

by Jonnathon Mccammon - Wednesday, 22 November 2023, 11:24 PM

Hi Markus,
You post was straight to the point with the explanations and very consice, however it did not miss an aspect of requirements for this Discussion so I must commented you on a job well done. I understand everything fully and have nothing to critique about your work. This was condensely accurate and I appreciate the short but informative read. Keep it up.
With respect
Jonnathon

67 words

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Re: Discussion Forum Assignment
by Jonnathon Mccammon - Wednesday, 22 November 2023, 11:20 PM

Hi Wensky,
Your post was chalk full of great explanation of the content required for this week's work. I admire the details in your elaboration and the effort in your work. This was very well done, and understandable, I have nothing to critique, keep it up, good job.
With respect
Jonnathon
51 words

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Re: Discussion Forum Assignment
by Jonnathon Mccammon - Wednesday, 22 November 2023, 11:18 PM

Hi Haya,
Your post is exceptionally detailed on all aspects of explanation required for this week's discussion post and participation. Excellently done, I clearly understood your post and the concepts used in their entirety. Keep up the good work.
With respect
Jonnathon
42 words

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Re: Discussion Forum Assignment
by Husna Abdulrahman - Wednesday, 22 November 2023, 9:30 PM

Hello Haya Alharethi,

Thank you for the detailed and thorough explanations! Your responses to the queries are clear, well-organized, and easy to understand. I appreciate the examples provided, as they help to illustrate each concept effectively. It's evident that you have a strong grasp of set theory, and your presentation style makes it accessible for others to learn. Keep up the excellent work! If you have more content or topics like this, I look forward to reading them.

Best regards,
Husna
81 words

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Re: Discussion Forum Assignment
by Husna Abdulrahman - Wednesday, 22 November 2023, 9:28 PM

Hello Haya Alharethi,

Thank you so much! I appreciate your encouragement. I'll definitely keep working hard. If you have any suggestions, feel free to share them.

Best regards,
Husna
29 words

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Re: Discussion Forum Assignment
by Jonnathon Mccammon - Wednesday, 22 November 2023, 8:46 PM

For this Discussion my example sets would be
[A = {x, y, z, w},
[B = {1, 2, 3, 4}
[U = {x, y, z, w, 1, 2, 3, 4, apples, mangoes, avocados}.

Now let's get to the questions

i. (A ∪ B) (Union): This is the set of all unique elements in set A and set B. For our example, (A ∪ B) = {x, y, z, w, 1, 2, 3, 4}

ii. (A ∩ B) (Intersection): This is the set of elements common to both set A and set B. In our example, (A cap B = {}) since there are no common elements.

iii. (A ∩ B) ∪ U): This is the union of the intersection of set A and set B with the universal set U. It would be equal to the universal set U since the intersection is an empty set.

iv. Power set of A: The power set of set A is the set of all possible subsets of set A, including the empty set and set A itself. For our example, the power set of set A is {}, {x}, {y}, {z}, {w}, {x, y}, {x, z}, {x, w}, {y, z}, {y, w}, {z, w}, {x, y, z}, {x, y, w}, {x, z, w}, {y, z, w}, {x, y, z, w}

v. (A') (Complement of set A): This is the set of elements in the universal set U that are not in set A. For our example, (A' = {1, 2, 3, 4, apples, mangoes, avocados}

vi. (Ø ∩ B): The intersection of the empty set with set B is always the empty set. Noting is common with nothing so it is nothing.

vii. (A × B) (Cartesian Product): This is the set of all possible ordered pairs where the first element is from set A and the second element is from set B. (Doerr & Levasseur, 2022) For our example, (A × B = {(x, 1), (x, 2), (x, 3), (x, 4), (y, 1), (y, 2), (y, 3), (y, 4), (z, 1), (z, 2), (z, 3), (z, 4), (w, 1), (w, 2), (w, 3), (w, 4)}

viii. (A - B) (Difference): This is the set of elements in set A but not in set B. For our example, (A - B = \{x, y, z, w}

ix. (A - B) ∪ (B - A) : This is the symmetric difference of set A and set B, which is the set of elements that are in either set A or set B but not in both. For our example, (A - B) ∪ (B - A) = {x, y, z, w, 1, 2, 3, 4}

x. Proving De Morgan's Law: Let's prove (A ∩ B)' = A' ∪ B'). The left side is the complement of the intersection of set A and set B, which is the set of elements not in both set A and set B. The right side is the union of the complements of set A and set B, which is the set of elements not in set A or not in set B. In both cases, we are considering elements not common to both sets A and B.

Reference:

Doerr, A., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). [Link to textbook licensed under CC BY-NC-SA]. Discrete Mathematics Resources. Retrieved November 21, 2023, from https://discretemath.org/ads/index-ads.html

582 words

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Re: Discussion Forum Assignment

by Haya Alharethi - Wednesday, 22 November 2023, 8:43 PM

Well done keep it up

5 words

Rate: Rate...

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Re: Discussion Forum Assignment

by Haya Alharethi - Wednesday, 22 November 2023, 8:42 PM

The following are the responses to the queries:

I. A ∪ B

The collection of elements that are either in A, B, or both A and B is the union of two sets, A and B.

A ∪ B = {1, 2, 3, 4, 5, 6}, for instance, if A = {1, 2, 3, 4} and B = {2, 4, 5, 6}.

ii. A ∩ B

The collection of elements that are in both sets A and B is known as the intersection of the two sets.

A ∩ B = {2, 4}, for instance, if A = {1, 2, 3, 4} and B = {2, 4, 5, 6}.

iii. (A ∩ B) ∪ U

The collection of elements that are in A and B, in U, or in both A and B and U is the union of the intersection of two sets, A and B, with the universal set U.

For example A = {1, 2, 3, 4}, B = {2, 4, 5, 6}, and U = {a, b, c, d, 1, 2, 3, 4, apples, mangoes, avocados}, for instance. Then, (A ∩ B) ∧ U = {1, 2, 3, 4, a, b, c, d, apples, mangoes, avocados}.

iv. The Set of A Power

The collection of all feasible subsets of a set A is known as its power set.

For or example, if A = {1, 2, 3}, then the power set of A is {{}, {1}, {2}, {3}, {1, 2}, {1, 3}, {2, 3}, {1, 2, 3}}.

v. A’

The complement of a set A is the collection of elements which are not in A.

For example, if A = {1, 2, 3}, then A’ = {4, 5, 6, ...}.

vi. ∅∩B

The intersection of the empty set ∅ and a set B is the empty set.

For example, if B = {1, 2, 3}, then ∅∩B = {}.

vii. A × B

The collection of ordered pairs (a, b) where an is in A and b is in B is the Cartesian product of two sets, A and B.

For example, if A = {1, 2, 3} and B = {4, 5, 6}, then A × B = {(1, 4), (1, 5), (1, 6), (2, 4), (2, 5), (2, 6), (3, 4), (3, 5), (3, 6)}.

viii. A-B

The difference of two sets A and B is the collection of elements which are in A but not in B.

For example, if A = {1, 2, 3} and B = {2, 4, 5}, then A-B = {1, 3}.

ix. (A − B) ∪ (B − A)

The collection of elements that are in A but not in B, in B but not in A, or in both A and B is the union of the difference of two sets A and B with the difference of two sets B and A.

For example, if A = {1, 2, 3} and B = {2, 4, 5}, then (A − B) ∪ (B − A) = {1, 3, 4, 5}.

X.Establish any one of A and B's De Morgan identities.

Two identities, known as De Morgan's laws, establish a relationship between the complement of an intersection and the union of complements, as well as the complement of a union.

De Morgan's law number one is:

A' ∩ B' = (A ∪ B)'

According to this law, the intersection of the complements of A and B equals the complement of the union of two sets, A and B.
580 words

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Re: Discussion Forum Assignment
by Rosemary Robinson - Wednesday, 22 November 2023, 8:30 PM

Superb submission post. Your assignment was straightforward and easily comprehensible.
10 words

Rate: Rate...

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Re: Discussion Forum Assignment
by Rosemary Robinson - Wednesday, 22 November 2023, 8:26 PM

Impressive submitted post. Your assignment is straightforward and comprehensible.
9 words

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Re: Discussion Forum Assignment
by Rosemary Robinson - Wednesday, 22 November 2023, 8:23 PM

Superb submission post. Your assignment was straightforward and readily comprehensible.
10 words

Rate: Rate...

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Re: Discussion Forum Assignment
by Markus Buchanan - Wednesday, 22 November 2023, 8:17 PM

Hey Mohamed,

I thought everything was written well thought out, To go the extra mile I think it would've been better to clearly list out the steps you made to answer the De Morgan's theory question but spot on with everything!
41 words

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Re: Discussion Forum Assignment
by Markus Buchanan - Wednesday, 22 November 2023, 8:13 PM

`Hey Luc,

Thank you for your discussion post ! Nice job with organizing your assignment everything was clearly explained and thought out. I definitely will model this format.
28 words

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Re: Discussion Forum Assignment
by Husna Abdulrahman - Wednesday, 22 November 2023, 8:06 PM

Hello Francis Oirouyame,

Thank you so much for your thoughtful and encouraging feedback! I'm delighted to hear that my explanations were helpful in making set theory concepts more accessible. If you have any more questions or if there's anything else you'd like to explore within the realm of set theory or any other topic, feel free to reach out. Your positive feedback is truly appreciated!

Best regards,
Husna
68 words

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Re: Discussion Forum Assignment
by Markus Buchanan - Wednesday, 22 November 2023, 7:53 PM

My Apologies here is my reference:

Levin, O. (2021). Discrete Mathematics An Open Introduction (4th ed.). University of Northern Colorado. https://my.uopeople.edu/pluginfile.php/1812402/mod_book/chapter/475429/Levin_Text.pdf

21 words

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Re: Discussion Forum Assignment

by Michael Uko - Wednesday, 22 November 2023, 7:43 PM

Hello Ahmad,
Your discussion post is comprehensive and well-structured. You attempted all the questions and thoroughly explained De Morgan's Law. I appreciate the level of effort you put into offering additional resources and references in your post, creating a rich learning environment for those of us eager to explore further dimensions of mathematical concepts. Keep up the great work!

59 words

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Re: Discussion Forum Assignment

by Wensky Louis Jean - Wednesday, 22 November 2023, 7:43 PM

Let's consider the three sets A, B, and U, defined as follows:
A = {1, 2, 3, 4}, B = {a, b, c, d}, and U = {1, 2, 3, 4, a, b, c, d, x, y, z}.

Now, let's answer the questions:
i. A U B: The union of sets A and B is the set of all elements that are in A, or in B, or in both (Levin, 2021). So, A U B = {1, 2, 3, 4, a, b, c, d}.

ii. A ∩ B: The intersection of sets A and B is the set of all elements that are common to both A and B (Levin, 2021). In this case, A ∩ B = {}.

iii. (A ∩ B) U U: This is the union of the intersection of A and B with the universal set U (Levin, 2021). Since A ∩ B = {}, (A ∩ B) U U = U = {1, 2, 3, 4, a, b, c, d, x, y, z}.

iv. Power set of A: The power set of a set is the set of all its subsets (Doerr & Levasseur, 2022). P(A) = {{}, {1}, {2}, {3}, {4}, {1, 2}, {1, 3}, {1, 4}, {2, 3}, {2, 4}, {3, 4}, {1, 2, 3}, {1, 2, 4}, {1, 3, 4}, {2, 3, 4}, {1, 2, 3, 4}}.

v. The complement of A is the set of all elements in the universal set U that are not in A (Levin, 2021). In this case, A' = {a, b, c, d, x, y, z}.

vi. {} ∩ B: This is the intersection of the empty set with B, which is always the empty set (Levin, 2021). Therefore, {} ∩ B = {}

vii. A X B: The Cartesian product of A and B is the set of all ordered pairs where the first element is from A and the second element is from B (Doerr & Levasseur, 2022). A X B = {(1, a), (1, b), (1, c), (1, d), (2, a), (2, b), (2, c), (2, d), (3, a), (3, b), (3, c), (3, d), (4, a), (4, b), (4, c), (4, d)}.

viii. A - B is the set of elements that are in A but not in B. A - B = {1, 2, 3, 4}.

ix. (A - B) U (B - A): This is the union of the elements that are in A but not in B and the elements that are in B but not in A (Levin, 2021). (A - B) U (B - A) = {1, 2, 3, 4, a, b, c, d}.

x. De Morgan's Identity: One of De Morgan's identities states that the complement of the union of two sets is equal to the intersection of their complements (Levin, 2021). Mathematically, (A U B)' = A' ∩ B'. In our example, (A U B)' is the complement of {1, 2, 3, 4, a, b, c, d}, which is {x, y, z}, and A' ∩ B' is {x, y, z} as well, confirming the validity of De Morgan's identity.

Reference
Doerr, A., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). licensed under CC BY-NC-SA
Levin, O. (2021). Discrete mathematics: An open introduction (3rd ed.). licensed under CC 4.0

545 words

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Re: Discussion Forum Assignment

by Francis Oirouyame - Wednesday, 22 November 2023, 7:42 PM

Ahmad, this is really interesting. Your explanations are excellent; they make difficult ideas in set theory simple to understand. Set theory enthusiasts will find it to be an invaluable resource as a result of the examples provided to clarify the concepts. All things considered, your piece is a very helpful resource in this area.

54 words

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Re: Discussion Forum Assignment

by Francis Oirouyame - Wednesday, 22 November 2023, 7:39 PM

Many ideas in set theory, including union, intersection, complement, Cartesian product, and De Morgan's Law, were succinctly and clearly explained by you. These ideas are illustrated and made more understandable by the provided instances. All things considered, it is a useful tool for anyone learning about or interested in set theory. Well done

53 words

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Re: Discussion Forum Assignment

by Michael Uko - Wednesday, 22 November 2023, 7:33 PM

Hello Janice,
Your discussion post was well-calculated and presented. The attention to detail in your explanations of the reasoning behind each step in the mathematical solutions highlighted your commitment to ensuring that everyone in the class could follow and learn from your work

43 words

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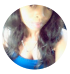

Re: Discussion Forum Assignment

by Rosemary Robinson - Wednesday, 22 November 2023, 7:31 PM

Please find the attached assignment for your attention.

8 words

Discussion Forum 1 (14).docx

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Re: Discussion Forum Assignment

by Markus Buchanan - Wednesday, 22 November 2023, 7:30 PM

A = {2,4,6}

B = {m,a,r}

U = {2,4,6,m,a,r}

Questions:

i. A ∪ B

· This represents the union of A and B which is a set containing all of the unique elements from A or B or both

· {2,4,6,m,a,r}

ii. A ∩ B

· This represents an intersection of set A and B which is a set containing all the in common elements from set A and B

· ∅

iii. (A ∩ B) ∪ U

· This represents the intersection of set A and B and a union of the universal set, so the set contain all of the in common elements of both A and B or all of the elements of U. Since U has all of the elements of the intersection of A and B the set will just be the set U

· {2,4,6,m,a,r}

iv. The Power set of A.

· The power set of A represents all of the different subsets of A

· {Ø, {2},{4},{6},{2,4},{2,6},{4,6},{2,4,6}}

v. A’

· This represents a compliment set of A which is everything in the U set that isn’t in the A set

· {m,a,r}

vi. Ø∩B

· This represents the intersection of a empty set and B

· Which would be Ø

vii. A × B

· This represents the cartesian product which is a set of ordered pairs with the first element being from A and the second from B

· {(2,m),(2,a),(2,r)

viii. A-B

· This represents the difference of set A from B

· {2,4,6}

ix. (A − B) ∪ (B − A)

· {2,4,6,m,a,r}

x. Prove any one De Morgan identity for A and B.

· A ∩ B’ = A’ U B’

· De Morgan’s second law : The compliment of intersection demonstrates that the compliment of the intersection of sets A and B equal to the union of the their individual compliments

· A∩B’ = {2,4,6,m,a,r}

A’ = {m,a,r}

B’ = {2,4,6}

A’UB’ ={2,4,6,m,a,r}

A ∩ B’ = A’ U B’

331 words

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Re: Discussion Forum Assignment

by Haya Alharethi - Wednesday, 22 November 2023, 7:21 PM

Numerous new notations have been introduced in this initial unit. Notation for sets and operations on sets, and for logical statements. In mathematics, notation is essential, yet it can also be challenging to master and a source of irritation. I want to talk about the advantages and disadvantages of mathematical notation in this debate. Think about the following inquiries:

(A) List two applications for mathematical notation. In each instance, provide an example to highlight the advantages of your proposal. You may argue, for instance, that notation is helpful because, in situations when a symbol is meant to represent something that is difficult to write down—like an infinite set or an infinite decimal expansion—its strength enables us to represent things that we otherwise would not be able to. An illustration of this would be the notation used to represent the infinite collection of all real numbers.

Taking inspiration from skillsyouneed (2021) Similar to any formal language, mathematical notation seeks to eliminate ambiguity in propositions by reducing them to a small number of symbols, each of which can have only one possible arrangement.

For instance, we will use y = 2 to indicate that y is equal to 2.

This scientific language also makes it possible to a lesser extent, to facilitate communication between mathematicians who do not speak the same language. If it does not completely replace natural language, it allows the most complex mathematical concepts to be expressed in a form which is almost identical according to many languages and cultures, thus avoiding misunderstandings on mathematical concepts by people not mastering all the grammatical and syntactic subtleties of the language of communication used.

(b) Describe one potential drawback of using mathematical notation. For example, you could say that learning a lot of different notations is time-consuming. Try to give a specific example to make your suggestion clear to others. You don't have to believe that your suggestion is a genuine disadvantage.

Despite all the effort made for mathematical symbolism, we still note divergences. Even within the cultural family using Latin mathematical notation. Certain concepts of formal language nevertheless remain specific to a given linguistic pool. Thus, in the French- speaking, mathematical literature, the assertion of A ⊂ B means "the set A is a subset of B or is equal to B" whereas in the literature of English-speaking mathematician, it will rather mean "the set A is a strict subset of B".

References:

Skillsyouneed (2021). Common Mathematical Symbols and Terminology: Math Glossary. Retrieved from skillsyouneed/num/common-synbols.html

417 words

Rate: Rate...

Permalink Show parent

Re: Discussion Forum Assignment

by Tamara Gage - Wednesday, 22 November 2023, 7:13 PM

Angelo,
You did a great job breaking all the concepts apart in your explanations. I particularly liked how you went over question 9 on (A − B) ∪ (B − A). You made it simple and easy to understand what was happening in your equations and how you got the end results. Great job this week and I can't wait to read more of your posts going forward.

68 words

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Re: Discussion Forum Assignment

by Tamara Gage - Wednesday, 22 November 2023, 7:09 PM

Janice,
You did a great job at breaking up each of your segments into separate parts so it was easy to understand and read. I would have liked a little more explanation on the empty set on question eight, such as how the empty set is a subset of every set and why that is. I think you did a great job really explaning how power sets work, and gave a great example. Great first post, hope the rest of your week goes well.

84 words

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Re: Discussion Forum Assignment

by Tamara Gage - Wednesday, 22 November 2023, 7:05 PM

Luc,

Great first post! I really appreciated the bolding to help break up the different sections of the question. I will have to use that next time I post. I really liked your explanation of Morgan's law of intersection. Having your universal set be restricted to 1 through 15 made it managable. I didn't think to restrict my set and give specific examples in my explanation of the topic. Great job going above and beyond on your post this week!

80 words

Rate: Rate...

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Re: Discussion Forum Assignment
by Michael Uko - Wednesday, 22 November 2023, 7:03 PM

Hello Luc Bitsy,
Excellent job on your discussion post, the sets are well-created, and the subsequent exercises well-answered. De Morgan's Identity was excellently defined and proven. Your meticulous approach to research and fact-checking is commendable. You consistently provide well-referenced information that enhances the credibility of our discussions. Your commitment to reliable sources is a great asset to our learning community.
60 words

Rate: Rate...

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Re: Discussion Forum Assignment
by Husna Abdulrahman - Wednesday, 22 November 2023, 6:52 PM

Hello Janice Zemato,

Thank you so much for your kind words and positive feedback! I'm delighted to hear that you found my discussion post helpful and clear. It's always my aim to present complex concepts in a way that's easy to understand, so I'm thrilled that you feel I achieved that. I'm glad the examples and explanations, such as A∪B, A∩B, (A∩B)∪U, the power set of A, A', ∅∩B, A×B, A-B, (A−B)∪(B−A), and De Morgan's Law, resonated with you and provided additional knowledge and clarity on these topics. If you have any further questions or if there's anything else you'd like to discuss, feel free to let me know. Thank you again for your encouraging words. I appreciate your feedback and support.

Best regards,
Husna
125 words

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Re: Discussion Forum Assignment
by Tamara Gage - Wednesday, 22 November 2023, 6:44 PM

My sets:
A={4, 7, 11, q}
B={q, r, x, y}
U={4, 7, 11, q, r, x, y}

i. A ∪ B: The union of set A and set B would be:
U={4, 7, 11, q, r, x, y}
This being the universal set of set A and set B, which contains all elements of both sets.

ii. A ∩ B: The intersection of set A and set B would be:
A ∩ B={q}
As the only shared element between set A and set B is {q}.

iii. (A ∩ B) ∪ U : This would be the union of (A ∩ B) and U. Which would equal:
{q}+{4, 7, 11, q, r, x, y}
This equates to U={4, 7, 11, q, r, x, y} as the {q} element is already contained within the Universal set.

iv. The Power set of A: This would be all of the subsets that are inside of set A.
P(A):{4, 7, 11, q}, {4}.{7},{11},{q}, {4,7}, {4,11},{4,q},{7,11},{7,q},{7,11}, {4, 7, 11}, {4, 7, q}, {4, 11, q}, {7, 11, q},{∅}
These are all the potential subsets of set A.

v. A’ : This would be the complement of the set A, which would be everything that is not in set A.
It could be written as, A’ =U−A, where U is the universal set that contains all possible elements, while A is the set of A.

vi. ∅∩B This would be where the empty set and the set of B intersect. The empty set is a subset of all sets, so the intersection of the sets would be ∅. As ∅ is a subset of the set B.

vii. A × B: This would be the cartesian pair of set A and set B. This act just like factoring and would be:
A×B={(4,q),(4,r),(4,x),(4,y),(7,q),(7,r),(7,x),(7,y),(11,q),(11,r),(11,x),(11,q),(q,q),(q,r),(q,x),(q,y)}

viii. A-B: This would be all of A that is not in B. Which would be:
A-B={4, 7, 11}
This would exclude q, as it also exists within the set of B.

ix. (A − B) ∪ (B − A): This would be the union of the set of A minus the set of B with the set B minus A.
Which would be: {4, 7, 11} + {r, x, y}= {4, 7, 11, r, x, y}
This is all of set A and B except for the intersection of set A and B.

x. Prove any one De Morgan identity for A and B.
The law of intersection is: (A ∩ B)' = A' U B'
The (A ∩ B)' would be everything except for "q", which is the intersection between set A and set B. This ends up being the same as the complement of set A, which is everything not {r, x, y, q} and the complement of set B is everything not {4, 7, 11, q}. Therefore "q" would be everything that isn't part of set A or part of set B, which for B would be all of set A, except for "q" and for set A everything in set B, except for "q".

Works Referenced:
Doerr, A., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). licensed under CC BY-NC-SA
Levin, O. (2021). Discrete mathematics: An open introduction (3rd ed.). licensed under CC 4.0
Mathispower4u. (2022a, June 11). Introduction to sets and set notation [Video]. YouTube.
Mathispower4u. (2022c, June 14). Determine the union, intersection, and difference of two set given as lists [Video]. YouTube.
566 words

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Re: Discussion Forum Assignment
by Emediong Ukpong - Wednesday, 22 November 2023, 6:35 PM

Thank you
2 words

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Re: Discussion Forum Assignment
by Jacqueline Falcone - Wednesday, 22 November 2023, 6:27 PM

Hello, Zainab habib. Good job on showing examples on each theory. I could easily understand the examples provided. Also well done with the reference at the bottom. For overall great job and also being able to use names instead of numbers, that makes it more difficult to use.
48 words

Rate: Rate... Permalink Show parent

Re: Discussion Forum Assignment
by Jacqueline Falcone - Wednesday, 22 November 2023, 6:25 PM

Hello Luc Bitsy, great job on the homework assignment. Also nice job with adding the reference at the bottom. The math was clear and it can be understood easily by the examples you provided. Great job! Theories were explained well and very well use of the examples.
47 words

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Re: Discussion Forum Assignment
by Jacqueline Falcone - Wednesday, 22 November 2023, 6:23 PM

Hello, Mohamad Moumen Hallak. Good job on explaining the set theories with examples. It was very clear and to the point nothing confusing.
Keep up the great work!
28 words

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Re: Discussion Forum Assignment
by Olotu Okikiayo - Wednesday, 22 November 2023, 5:52 PM

Good work done this week discussion

6 words

Rate: Rate... Permalink Show parent

Re: Discussion Forum Assignment
by Olotu Okikiayo - Wednesday, 22 November 2023, 5:51 PM

Well done this week
4 words

Rate: Rate... Permalink Show parent

Re: Discussion Forum Assignment
by Olotu Okikiayo - Wednesday, 22 November 2023, 5:49 PM

Good work done this week discussion, I have been able to learn from your work

15 words

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Re: Discussion Forum Assignment
by Janice Zemato - Wednesday, 22 November 2023, 5:38 PM

Hello Husna,

Hope you are well.

You have good examples and explanations in this discussion post. The illustration from $A \cup B$, $A \cap B$, $(A \cap B) \cup U$, the power set of A, A', $\emptyset \cap B$, $A \times B$, A-B, $(A-B) \cup (B-A)$, and De Morgan's Law are wisely presented. Your work is easy to understand because you have highlighted some of the important words. And I agree with your illustrated definition of this set of operations. Your post gave me additional knowledge and clarity regarding these topics.

Thank you for sharing your insightful and well-explained discussion post.
Keep it up.
90 words

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Re: Discussion Forum Assignment
by Alexandra Vovk - Wednesday, 22 November 2023, 5:15 PM

Hey Hania, Good job
4 words

Rate: Rate... Permalink Show parent

Re: Discussion Forum Assignment
by Alexandra Vovk - Wednesday, 22 November 2023, 5:15 PM

Hey Olotu, Good job
4 words

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Re: Discussion Forum Assignment
by Alexandra Vovk - Wednesday, 22 November 2023, 5:14 PM

Hey Siarhei, Good job

4 words

Rate: Rate...

Permalink Show parent

Re: Discussion Forum Assignment
by Alexandra Vovk - Wednesday, 22 November 2023, 5:14 PM

Hey Mohamed, Good job

4 words

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Re: Discussion Forum Assignment
by Janice Zemato - Wednesday, 22 November 2023, 5:08 PM

Hi Emad,

Hope you are well.

You have posted a well-explained submission in this discussion. Your explanations from A ∪ B until the last which is De Morgan's Law are great. I love reading your post because it is easy to follow and understandable. The example you have provided is exactly what the prompt question asked.
In addition, this post is effectively used in scenarios like the one presented in the grocery store example to understand customer purchasing behavior across different categories.

Thank you for sharing your thoughtful and smart explanations in this discussion.
Keep it up.

97 words

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Re: Discussion Forum Assignment
by Husna Abdulrahman - Wednesday, 22 November 2023, 4:49 PM

Hi Mohamad Moumen Hallak,

Thank you so much for your thoughtful feedback! I'm thrilled to hear that you found the explanation of set operations clear and comprehensive. I believe in the importance of making complex concepts accessible, and it's great to know that my efforts in defining and illustrating each operation were effective. I'm pleased that the application of De Morgan's Law resonated with you. It's a fundamental concept in set theory, and I wanted to ensure its demonstration was both accurate and easy to grasp. Your recognition of the inclusion of references is appreciated. I believe that academic rigor enhances the credibility of the content, and I'm glad you found it to be a valuable addition. If you have any further questions or if there's anything else you'd like me to elaborate on, please feel free to let me know. I'm here to help and ensure a complete understanding of the material. Thanks again for your positive feedback!

Best regards,
Husna

162 words

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Re: Discussion Forum Assignment
by Francis Oirouyame - Wednesday, 22 November 2023, 4:32 PM

Hello! Your detailed exploration of set theory, including operations, and cardinality demonstrated a strong grasp of the subject. The step-by-step explanations and references to Doerr and Levasseur add academic rigor to your work. Overall, it was a well-presented discussion forum assignment.

41 words

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Re: Discussion Forum Assignment

by Janice Zemato - Wednesday, 22 November 2023, 4:29 PM

Hello Ahmad,

Your explanations of your three sets answers are clear and understandable. You have given a well-structured and informative post in this discussion. I appreciate every description in each set from A ∪ B until De Morgan's Law (for A and B). Your post gave me additional knowledge and clear insights regarding the Laws of set theory and related topics.
Additionally, set theory provides a powerful framework for analyzing relationships and intersections between sets.

Thank you for sharing your great post together with the references.
Keep it up.

89 words

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Re: Discussion Forum Assignment

by Ahmad Abdullah - Wednesday, 22 November 2023, 2:59 PM

Hello,
Your comprehensive breakdown of sets A, B, and U showcases a keen understanding of set theory principles and operations. Each statement, meticulously explained and exemplified, demonstrates the results of operations like union, intersection, complement, Cartesian product, and set differences with clarity. Your systematic approach to finding the power set of A, determining the complement of A, and exploring the intersection of an empty set with B illustrates a strong grasp of set theory fundamentals. Additionally, your proof of De Morgan's law for sets A and B through logical reasoning solidifies your understanding and application of these concepts. The inclusion of credible references further supports your explanations, offering a well-rounded and academically sound explanation of these set operations and principles.
Regards,
Ahmad Abdullah

123 words

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Re: Discussion Forum Assignment

by Ahmad Abdullah - Wednesday, 22 November 2023, 2:56 PM

Hello,
Your breakdown of sets A (even numbers), B (not even numbers), and the Universal set U demonstrates a clear understanding of set theory principles. Through precise explanations, you've showcased operations like union, intersection, complement, Cartesian product, and set differences, providing concise yet comprehensive insights into their outcomes. Your logical reasoning, including the proof of De Morgan's law for sets A and B, adds depth to the understanding of these fundamental concepts. This comprehensive exploration, coupled with references to credible sources like Levin's "Discrete Mathematics: An Open Introduction" and Levasseur & Doerr's "Applied Discrete Structures," underscores the meticulousness of your explanation and solidifies the academic foundation of your analysis.
Regards,
Ahmad Abdullah

112 words

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Re: Discussion Forum Assignment

by Ahmad Abdullah - Wednesday, 22 November 2023, 2:43 PM

Hello,

This breakdown of sets A, B, and U, along with their respective operations, showcases the foundational principles of set theory in action. It not only clarifies how unions, intersections, complements, and Cartesian products operate between sets but also emphasizes the significance of De Morgan's Identity in proving relationships between set unions and complements. This elucidation provides a concise yet comprehensive understanding of how set operations function within the context of specific sets, enabling a clearer grasp of their interrelations and properties.

Regards,
Ahmad Abdullah
85 words

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Re: Discussion Forum Assignment
by Mohamad Moumen Hallak - Wednesday, 22 November 2023, 1:50 PM

Hi Husna,

Great explanation of set operations! Your clarity in defining and illustrating each set operation, such as union, intersection, complement, power set, and Cartesian product, makes it easy to follow. Your application of De Morgan's Law is particularly well-demonstrated, showing a solid understanding of the concept. The inclusion of references also adds a touch of academic rigor. Overall, a well-constructed and comprehensive explanation of various set operations and principles. Well done!
72 words

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Re: Discussion Forum Assignment
by Husna Abdulrahman - Wednesday, 22 November 2023, 1:23 PM

Hello Mohamad Moumen Hallak,

Thank you for providing the set theory examples and identities. It seems like you've covered a comprehensive range of set operations and properties. Your explanations are clear and well-detailed, making it easy to understand each concept. The step-by-step breakdown of operations, such as union, intersection, complement, and Cartesian product, is helpful for anyone learning or reviewing set theory. Your use of symbols and notation is precise, contributing to the overall clarity of your explanations. Additionally, your demonstration of the De Morgan identity is accurate and effectively reinforces the concept. Great job in presenting the information in a structured and organized manner. Your work would certainly be beneficial for someone studying set theory or seeking a refresher on these mathematical concepts. Keep up the excellent work!

Best regards,
Husna
132 words

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Re: Discussion Forum Assignment
by Mohamad Moumen Hallak - Wednesday, 22 November 2023, 12:55 PM

Here is an example:
A = {2,4,6,8} / B = {1,3,5,7} / U = {1,2,3,4,5,6,7,8,9,10}

i. A ∪ B
This is all elements that are in A, or in B, or in both. In this case, it includes all the numbers from sets A and B without repetition.
A ∪ B = {1,2,3,4,5,6,7,8}

ii. A ∩ B
This is the set of elements common to both A and B. Since there are no common elements, the intersection is the empty set in this case.
A ∩ B = {}

iii. (A ∩ B) ∪ U
Here, we take the intersection of A and B (which is an empty set), and then union it with the universal set U. The result is the universal set U itself.
(A ∩ B) ∪ U = {1,2,3,4,5,6,7,8,9,10}

iv. The Power set of A.
The power set of a set is the set of all possible subsets of that set, including the empty set and the set itself.
P(A) = {{},{2},{4},{6},{8},{2,4},{2,6},{2,8},{4,6},{4,8},{6,8},{2,4,6},{2,4,8},{2,6,8},{4,6,8},{2,4,6,8}}

v. A’
The complement of A with respect to U is the set of all elements in U that are not in A.

A' = {1,3,5,7,9,10}

vi. ∅∩B
The intersection of the empty set with any set is always the empty set.
$\emptyset \cap B = \{\}$

vii. A × B
The Cartesian product of two sets A and B is the set of all possible ordered pairs where the first element is from A and the second element is from B.
A × B = {(2,1),(2,3),(2,5),(2,7),(4,1),(4,3),(4,5),(4,7),(6,1),(6,3),(6,5),(6,7),(8,1),(8,3),(8,5),(8,7)}

viii. A - B
This is the set of elements that are in A but not in B.
A − B = {2,4,6,8}

ix. (A − B) ∪ (B − A)
The symmetric difference between two sets is the set of elements that are in either of the sets but not in both.
(A−B) ∪ (B−A) = {1,2,3,4,5,6,7,8}

x. Prove any one De Morgan identity for A and B.
$(A \cup B)' = A' \cap B'$

This identity states that the complement of the union of two sets is equal to the intersection of their complements. It's one of the De Morgan laws in set theory.
357 words

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Re: Discussion Forum Assignment
by Zainab Habib - Wednesday, 22 November 2023, 12:05 PM

The explanations provided for each operation are clear and concise, making it easier to understand the concepts involved.
Regards,
Zainab Habib.
21 words

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Re: Discussion Forum Assignment
by Zainab Habib - Wednesday, 22 November 2023, 12:04 PM

The explanations provided for each operation are clear and concise, making it easier to understand the concepts involved.
18 words

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Re: Discussion Forum Assignment
by Zainab Habib - Wednesday, 22 November 2023, 12:02 PM

Hello Maqhawe Ncube,
The explanations provided for each operation are clear and concise, making it easier to understand the concepts involved. Well done
23 words

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Re: Discussion Forum Assignment
by Angelo Graser - Wednesday, 22 November 2023, 11:37 AM

Hi Lu,
You've effectively communicated the concepts of set theory, and your explanations for each operation are concise and to the point making it easier to understand, thank you. Also I really like your breakdown of De Morgan identity, not sure I might have fully understood what was expected but it does make sense.

54 words

Rate: Rate...

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Re: Discussion Forum Assignment

by Angelo Graser - Wednesday, 22 November 2023, 11:34 AM

Hi Maqhawe,
Your explanation and solutions are clear and accurate. You've correctly applied the set operations and provided a good explanation for each question. Very well done and easy to follow.

31 words

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Re: Discussion Forum Assignment

by Luc Bitsy - Wednesday, 22 November 2023, 11:32 AM

In mathematics, a set is a well-defined collection of distinct elements, called members or elements of the set. These elements can be anything: numbers, objects, people, or even other sets.

For this discussion, let's consider some simple sets:

A = {1, 3, 5, 7, 9}

B = {2, 4, 6, 7, 8, 10}

U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15}

i. A ∪ B (Union of A and B): The set that contains every element in either A or B (or both) is the union of two sets, A and B, represented as A ∪ B. Since it contains every element from both sets A and B without any duplicates, in this instance, A ∪ B would be {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}.

ii. A ∩ B (Intersection of A and B): A ∩ B, representing the intersection of two sets A and B, is the set that has all of the elements shared by both sets. Since that element is the only one that appears in both sets A and B, in this instance, A ∩ B would be {7}.

iii. (A ∩ B) ∪ U (Union of the intersection of A and B with U): First, we find the intersection of sets A and B, which is equal to 7. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 are the results of the union formed by this intersection and set U. This is because all of the members from set U as well as all of the components from the intersection (7) are included in the union.

iv. Power set of A: The set of all possible subsets of a set A is its power set, represented by P(A). In our eample, the power set of A would be {{}, {1}, {3}, {5}, {7}, {9}, {1, 3}, {1, 5}, {1, 7}, {1, 9}, {3, 5}, {3, 7}, {3, 9}, {5, 7}, {5, 9}, {7, 9}, {1, 3, 5}, {1, 3, 7}, {1, 3, 9}, {1, 5, 7}, {1, 5, 9}, {1, 7, 9}, {3, 5, 7}, {3, 5, 9}, {3, 7, 9}, {5, 7, 9}, {1, 3, 5, 7}, {1, 3, 5, 9}, {1, 3, 7, 9}, {1, 5, 7, 9}, {3, 5, 7, 9}, {1, 3, 5, 7, 9}}. It consists of every single element, every pair, every triple, and set A in its entirety.

v. A' (Complement of A): The set of all elements in the universal set U that are not in A is the complement of a set A, represented by the symbol A'. {2, 4, 6, 8, 10, 11, 12, 13, 14, 15} would be A' in this instance because these elements belong to the universal set U rather than set A.

vi. ∅ ∩ B (Intersection of the empty set with B): There are no elements in the empty set, indicated by ∅ or {}. The empty set itself is always the intersection of any set with it. As a result, ∅ ∩ B = ∅.

vii. A × B (Cartesian product of A and B): The collection of all ordered pairs containing the first element from A and the second element from B is known as the Cartesian product of two sets, A × B. In this instance, A × B would be {(1, 2), (1, 4), (1, 6), (1, 7), (1, 8), (1, 10), (3, 2), (3, 4), (3, 6), (3, 7), (3, 8), (3, 10), (5, 2), (5, 4), (5, 6), (5, 7), (5, 8), (5, 10), (7, 2), (7, 4), (7, 6), (7, 7), (7, 8), (7, 10), (9, 2), (9, 4), (9, 6), (9, 7), (9, 8), (9, 10)}.

viii. A - B (Set difference of A and B): The set that has all of the elements from A that are not in B is called the set difference of two sets, A and B, or simply A - B. Since these elements are in set A but not in set B, in this case, A - B would be {1, 3, 5, 9}.

ix. (A - B) ∪ (B - A) (Union of the set difference of A and B with the set difference of B and A): The set difference between A and B is first determined to be {1, 3, 5, 9}. The set difference between B and A is then determined to be {2, 4, 6, 8, 10}. Ultimately, we combine these two sets to create {1, 2, 3, 4, 5, 6, 8, 9, 10}.

x. De Morgan's Identity: The intersection of two sets' complements equals the complement of the union of those sets, according to one of De Morgan's identities (Doerr & Levasseur, 2022). Mathematically, it can be expressed as (A ∪ B)' = A' ∩ B'. Let's consider sets A = {1, 3, 5, 7, 9} and B = {2, 4, 6, 7, 8, 10} to illustrate this identity. The complement of set A would be A' = {2, 4, 6, 8, 10, 11, 12, 13, 14, 15} and the complement of set B would be B' = {1, 3, 5, 9, 11, 12, 13, 14, 15}. The union of sets A and B is A ∪ B = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}. The complement of the union is (A ∪ B)' = {11, 12, 13, 14, 15}. On the other hand, the intersection of the complements is A' ∩ B' = {2, 4, 6, 8, 10, 11, 12, 13, 14, 15} ∩ {1, 3, 5, 9, 11, 12, 13, 14, 15} = {11, 12, 13, 14, 15}. As we can see, the outcome is identical to the union's complement.

Reference:

Al Doerr., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). licensed under CC BY-NC-SA Jamaloodeen, M., Pinzon, K., Pragel, D., Roberts, J., & Siva, S. (2021). Discrete Math (3rd ed.). licensed under CC BY-NC.

994 words

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Discussion Forum Assignment

by Zainab Habib - Wednesday, 22 November 2023, 11:31 AM

A = {"red", "blue", "green", "yellow"}

B = {"purple", "orange", "green", "yellow"}

U = {"red", "blue", "green", "yellow", "purple", "orange"}

i. A ∪ **B:** The union of sets A and B gives us {"red", "blue", "green", "yellow", "purple", "orange"}. This set contains all the colors that are in either set A or set B.

ii. A ∩ B: The intersection of sets A and B is {"green", "yellow"}. These are the colors that are common to both sets A and B.

iii. (A ∩ B) ∪ **U:** First, we find the intersection of sets A and B, which is {"green", "yellow"}. Then, we take the union of this intersection with set U. The resulting set is U itself, {"red", "blue", "green", "yellow", "purple", "orange"}.

iv. The power set of A: The power set of A is the set of all possible subsets of A, including the empty set {}. In this case, the power set of A is { {}, {"red"}, {"blue"}, {"green"}, {"yellow"}, {"red", "blue"}, {"red", "green"}, {"red", "yellow"}, {"blue", "green"}, {"blue", "yellow"}, {"green", "yellow"}, {"red", "blue", "green"}, {"red", "blue", "yellow"}, {"red", "green", "yellow"}, {"blue", "green", "yellow"}, {"red", "blue", "green", "yellow"} }.

v. A': The complement of set A, denoted as A', is the set of all colors in the universal set U that are not in set A. In this case, A' = {"purple", "orange"}.

vi. ∅∩B: The intersection of the empty set {} with set B is always an empty set {}. There are no common colors between the two sets.

vii. A × B: The Cartesian product of sets A and B is the set of all possible ordered pairs where the first element comes from set A and the second element comes from set B. In this case, A × B = {("red", "purple"), ("blue", "purple"), ("green", "purple"), ("yellow", "purple"), ("red", "orange"), ("blue", "orange"), ("green", "orange"), ("yellow", "orange"), ("red", "green"), ("blue", "green"), ("green", "green"), ("yellow", "green"), ("red", "yellow"), ("blue", "yellow"), ("green", "yellow"), ("yellow", "yellow")}.

viii. A - B: The set difference between set A and set B is the set containing all the colors that are in set A but not in set B. In this case, A - B = {"red", "blue"}.

ix. (A − B) ∪ **(B − A):** First, we find the set difference of A and B, which is {"red", "blue"}. Then, we find the set difference of B and A, which is {"purple", "orange"}. Finally, we take the union of these two sets. The resulting set is {"red", "blue", "purple", "orange"}.

x. De Morgan's Law states that the complement of the union of two sets is equal to the intersection of their complements and vice versa.

(A ∪ B)' = A' ∩ B'

The left-hand side represents the complement of the union of sets A and B.

The right-hand side represents the intersection of the complements of sets A and B.

Assume x belongs to (A ∪ B)'. This means x is not in the union of sets A and B. Therefore, x must not belong to either A or B. Hence, x must belong to A' ∩ B'.

Now, assume x belongs to A' ∩ B'. This means x belongs to the intersection of sets A' and B'. Therefore, x must not belong to A and x must not belong to B. Hence, x must belong to (A ∪ B)'.

In both cases, we have shown that if a color x belongs to one side, it also belongs to the other side. Therefore, we have proved that (A ∪ B)' = A' ∩ B'.

Reference:

Jamaloodeen, M., Pinzon, K., Pragel, D., Roberts, J., & Siva, S. (2021). *Discrete Math* (3rd ed.). licensed under CC BY-NC

Levin, O. (2021). *Discrete mathematics: An open introduction* (3rd ed.). licensed under CC 4.0

630 words

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Re: Discussion Forum Assignment

by Angelo Graser - Wednesday, 22 November 2023, 11:31 AM

Hi Mohamed,
Your post is well-structured and clear. You've correctly answered each question and provided accurate solutions, thank you. Your use of notation and explanations are precise, making it easy to follow and understand. Well done.
36 words

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Re: Discussion Forum Assignment

by Husna Abdulrahman - Wednesday, 22 November 2023, 11:11 AM

Hello Hania Rizwana,

I wanted to reach out and express my appreciation for your clear and thorough explanation of set operations using sets A, B, and U. Your breakdown of each operation provided a comprehensive understanding of the concepts involved. The choice of colorful elements for sets A, B, and U added a playful touch to the explanation, making it engaging and visually appealing. The step-by-step exploration of operations such as union, intersection, and set differences was presented in a manner that is accessible to readers with varying levels of familiarity with set theory. Your attention to detail in showcasing practical examples, like the Cartesian product and the application of De Morgan's identity, demonstrated a depth of understanding and made the content more relatable. The inclusion of the Cartesian product, in particular, provided a concrete illustration of ordered pairs from sets A and B. Moreover, your effort to not only present the mathematical expressions but also to explain the reasoning behind them, especially in the case of De Morgan's identity, is commendable. It adds value for readers seeking not just formulas but a true comprehension of the underlying principles. In summary, thank you for your efforts in making the world of set theory accessible and enjoyable. Your clear explanations and illustrative examples have undoubtedly contributed to a better understanding of these concepts.

Best regards,
Husna
225 words

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Re: Discussion Forum Assignment

by Janice Zemato - Wednesday, 22 November 2023, 11:08 AM

We'll create three sets and answer the questions:
Let's consider the following sets:
A={1,3,5,7}
B={2,4,6,8}
U= {1,2,3,4,5,6,7,8,9,10}

Here, let's answer the questions.

i. **A∪B**: This represents the union of sets A and B, which includes all unique elements from both sets. In this case, $A \cup B=\{1,2,3,4,5,6,7,8\}$.

ii. **A∩B**: This represents the intersection of sets A and B, which includes only the elements common to both sets. In this case, $A \cap B = \{\}$ (empty set, as there are no common elements).

iii. **(A∩B)∪U**: This represents the union of the intersection of A and B with the universal set U. Since $A \cap B = \{\}$, $(A \cap B) \cup U=U$.

iv. **Power set of A**: The power set of A is the set of all subsets A, including A itself and the empty set. For A = {1,3,5,7}, the power set is $\{\{\},\{1\},\{3\},\{5\},\{7\},\{1,3\},\{1,5\},\{1,7\},\{3,5\},\{3,7\},\{5,7\},\{1,3,5\},\{1,3,7\},\{1,5,7\},\{3,5,7\},\{1,3,5,7\}\}$.

v. **A':** This represents the complement of set A concerning the universal set U. In this case, $A'=U-A=\{2,4,6,8,9,10\}$.

vi. **∅∩B:** This represents the intersection of the empty set with set B, which is always an empty set $(\emptyset)$.

vii. **A×B:** This represents the Cartesian product of sets A and B, which is the set of all possible ordered pairs (a, b) where a∈A and b∈B. In this case, $A \times B=\{(1,2),(1,4),(1,6),(1,8),(3,2),(3,4),(3,6),(3,8),(5,2),(5,4),(5,6),(5,8),(7,2),(7,4),(7,6),(7,8)\}$.

viii. **A-B:** This represents the set of elements that are in A but not in B. In this case, $A-B=\{1,3,5,7\}$.

ix. **(A-B) ∪ (B-A):** This represents the symmetric difference of sets A and B, which is the set of elements that are in either A or B but not in both. In this case, $(A-B) \cup (B-A)=\{1,2,3,4,5,6,7,8\}$.

x. **De Morgan's Law:** Let's prove De Morgan's Laws, specifically (A∩B)'=A' ∪ B'. The complement of the intersection of A and B is equal to the union of the complements of A and B.

$(A \cap B)'=U-(A \cap B)=U-\{\}=U$
$A' \cup B'=(U-A) \cup (U-B)=(U-\{1,3,5,7\}) \cup (U-\{2,4,6,8\})=\{2,4,6,8,9,10\} \cup \{1,3,5,7,9,10\}=U$

Lastly, set theory provides a powerful framework for analyzing relationships and intersections between sets, and it can be effectively used in scenarios like the one presented in the grocery store example to understand customer purchasing behavior across different categories.

Reference

Doerr, A., & Levasseur, K. (2022). *Applied discrete structures* (3rd ed.). licensed under CC BY-NC-SA

350 words

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Re: Discussion Forum Assignment

by Husna Abdulrahman - Wednesday, 22 November 2023, 11:06 AM

Hello Mohamed Rashed,

I wanted to express my appreciation for the clear and comprehensive explanation you provided regarding sets A, B, and U, along with their respective operations. Your breakdown of each set and the subsequent responses to various set-related queries were both enlightening and easy to follow. The choice of sets {1, 2, 3, 4}, {5, 6, 7, 8}, and {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} for A, B, and U, respectively, helped to illustrate the concepts effectively. Your step-by-step approach in explaining operations such as union, intersection, and set differences made the content accessible to readers of varying familiarity with set theory. The inclusion of practical examples, such as the Cartesian product and De Morgan's Identity, added depth to the discussion and showcased the versatility of these concepts. Additionally, your use of logical reasoning to prove De Morgan's Identity demonstrated a high level of understanding and provided an extra layer of insight for readers interested in the theoretical underpinnings. Overall, your effort in presenting complex set operations in a clear and engaging manner is commendable. It's evident that you invested time and thought into ensuring your explanation was both informative and accessible. Thank you for sharing your knowledge and making the world of set theory more approachable.

Best regards,
Husna
216 words

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Re: Discussion Forum Assignment
by Michael Uko - Wednesday, 22 November 2023, 11:04 AM

To complete the task, I will create three sets A and B, each with 4 elements, and a Universal set U. Then, I will explain the answers to the given questions.

Sets Creation

Let's create the sets A, B, and U as follows:

A = {1, 2, 3, 4}

B = {red, green, blue, yellow}

U = {1, 2, 3, 4, red, green, blue, yellow, 5, 6, 7, 8}

Answers to the Questions

i. A ∪ B (Union of A and B)

A ∪ B = {1, 2, 3, 4, red, green, blue, yellow}

ii. A ∩ B (Intersection of A and B)

A ∩ B = ∅ (empty set) since A and B have no common elements

iii. (A ∩ B) ∪ U (Union of the intersection of A and B with U)

(A ∩ B) ∪ U = {1, 2, 3, 4, red, green, blue, yellow, 5, 6, 7, 8}

iv. The Power set of A

The power set of A, denoted as P(A), is the set of all subsets of A, including A itself and the empty set. For A = {1, 2, 3, 4}, the power set P(A) = {{}, {1}, {2}, {3}, {4}, {1, 2}, {1, 3}, {1, 4}, {2, 3}, {2, 4}, {3, 4}, {1, 2, 3}, {1, 2, 4}, {1, 3, 4}, {2, 3, 4}, {1, 2, 3, 4}}

v A’ (Complement of A)

A’ = U - A = {red, green, blue, yellow, 5, 6, 7, 8}

vi. ∅∩B (Intersection of the empty set with B)

∅∩B = ∅ (empty set) since the empty set has no elements

vii. A × B (Cartesian product of A and B)

A × B = {(1, red), (1, green), (1, blue), (1, yellow), (2, red), (2, green), (2, blue), (2, yellow), (3, red), (3, green), (3, blue), (3, yellow), (4, red), (4, green), (4, blue), (4, yellow)}

viii. A-B (Set difference of A and B)

A-B = {1, 2, 3, 4} - {red, green, blue, yellow} = {1, 2, 3, 4}

ix. (A − B) ∪ (B − A) (Symmetric difference of A and B)

(A − B) ∪ (B − A) = ({1, 2, 3, 4} - {red, green, blue, yellow}) ∪ ({red, green, blue, yellow} - {1, 2, 3, 4}) = {1, 2, 3, 4, red, green, blue, yellow}

X. De Morgan's Law

De Morgan's Law states that the complement of the union of two sets is equal to the intersection of their complements, and vice versa. For sets A and B, one of the De Morgan's identities is:

(A ∪ B)' = A' ∩ B'

The complement of the union of A and B is equal to the intersection of their complements

.

These are the answers to the questions based on the provided sets A, B, and U.

References

Levin, O. (2021). Discrete mathematics: An open introduction (3rd ed.). licensed under CC 4.0https://discrete.openmathbooks.org/dmoi3/frontmatter.html

Al Doerr., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). licensed under CC BY-NC-SA

https://discretemath.org/ads/index-ads.html

OpenStax. (n.d). Set Operations with Three Sets

https://openstax.org/books/contemporary-mathematics/pages/1-5-set-operations-with-three-sets

Cuemath, (n.d). Universal Set

https://www.cuemath.com/algebra/universal-set/

511 words

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Re: Discussion Forum Assignment

by Husna Abdulrahman - Wednesday, 22 November 2023, 11:01 AM

Hello Emad Shawky Ellamsy,

I wanted to take a moment to express my gratitude for the fantastic exploration of set theory and its practical applications that was shared with us. It's not every day that you come across such a clear, engaging, and insightful breakdown of abstract concepts. The analogy of navigating a grocery store to explain set theory was not only creative but also made the subject incredibly relatable. It's refreshing to see how something as seemingly complex as set theory can find practical applications in our everyday lives, even in the aisles of a grocery store. The step-by-step journey through set operations, using sets A, B, and U, was not only educational but also enjoyable. The choice of elements, including letters, numbers, and fruits, added a playful touch that made the entire learning experience both fun and informative. Each set operation was explained with clarity, and the example sets were used to perfection, making it easy for everyone to follow along. The practical scenarios, like analyzing shopping habits, brought a real-world dimension to the abstract concepts, making them more tangible. The inclusion of the De Morgan identity and its proof added an extra layer of sophistication to the discussion. The logical progression of the proof was well-articulated, and it provided a satisfying conclusion to the exploration. In conclusion, thank you for sharing this insightful journey into set theory! It's evident that a lot of effort and thought went into crafting this explanation, and it has certainly made the world of sets more approachable and intriguing. Looking forward to more enlightening discussions in the future!

Best regards,
Husna

269 words

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Re: Discussion Forum Assignment

by Husna Abdulrahman - Wednesday, 22 November 2023, 10:53 AM

Set A: {watermelon, blueberry, pineapple, cherry}
Set B: {polar bear, camel, fox, hen}
Set U: {watermelon, blueberry, pineapple, cherry, polar bear, camel, fox, hen, mango, raspberry, elk, wolf}

A∪B: The union of two sets A and B can be defined as the collection of all elements that belong to either A, B, or both A and B. In this scenario, sets A and B amalgam is {watermelon, blueberry, pineapple, cherry, polar bear, camel, fox, hen}.

A∩B: Empty set {} as A and B have no common elements. The intersection of sets A and B could be formally defined as the set that consists of all elements shared by both A and B. In the present scenario, the intersection of sets A and B is deemed the null set, as no element that simultaneously belongs to both A and B exists.

(A∩B)∪U: In this scenario, the union of the intersection of sets A and B with the universal set U results in the universal set U. (A∩B)∪U=U. As the intersection of A and B is empty, the union with any set is the set itself.

The power set of A: The power set of a set A is the set of all possible subsets of A. In this scenario, the power set of A is {{}, {watermelon}, {blueberry}, {pineapple}, {cherry}, {watermelon, blueberry}, {watermelon, pineapple}, {watermelon, cherry}, {blueberry, pineapple}, {blueberry, cherry}, {pineapple, cherry}, {watermelon, blueberry, pineapple}, {watermelon, blueberry, cherry}, {watermelon, pineapple, cherry}, {blueberry, pineapple, cherry}, {watermelon, blueberry, pineapple, cherry}}.

A': The complement of a set A is the set of all elements not in A. (Al Doerr & Levasseur, 2023). In this scenario, the complement of A is {polar bear, camel, fox, hen, mango, raspberry, elk, wolf}.

ø**∩B:** The intersection sets A and B are the set of all elements in both A and B. In this scenario, the intersection of the empty set and B is the empty set ø ∩ B = {}

A×B: The Cartesian product sets A, and B are defined as the set containing all possible ordered pairs a, b where an is a component of A and b is an element of B such that a is in A and b is in B. In this scenario, the Cartesian product of A and B is {{watermelon, polar bear}, {watermelon, camel}, {watermelon, fox}, {watermelon, hen}, {blueberry, polar bear}, {blueberry, camel}, {blueberry, fox}, {blueberry, hen}, {pineapple, polar bear}, {pineapple, camel}, {pineapple, fox}, {pineapple, hen}, {cherry, polar bear}, {cherry, camel}, {cherry, fox}, {cherry, hen}}.

A-B: The difference between sets A and B is the set of all elements in A but not B (Levin, 2022). In this scenario, {watermelon, blueberry, pineapple, cherry}

(A−B)∪(B−A): The union of sets A and B is the collection of all elements that belong to sets A, B, or both sets A and B. The distinction between sets A and B can be defined as the set comprising all elements present in set A but absent in set B. So, there is a symmetric difference between A and B {watermelon, blueberry, pineapple, cherry, polar bear, camel, fox, hen}.

De Morgan's Law: De Morgan's Law postulates that the complement of the union of sets A and B is equivalent to the intersection of the complements of A and B. A∪B=(A′∩B′)′. In this scenario, the complement of the union of A and B is {polar bear, camel, fox, hen, mango, raspberry, elk, wolf}, and the intersection of the complements of A and B is {polar bear, camel, fox, hen, mango, raspberry, elk, wolf}. Therefore, De Morgan's Law is proven.

References

Al Doerr., & Levasseur, K. (2023, May 21). *Applied discrete structures*. Discretemath organization. https://discretemath.org/ads/index-ads.html

Levin, O. (2022, November 9). *Discrete mathematics: An open introduction, 3rd edition.* Discrete open math books organization. https://discrete.openmathbooks.org/dmoi3/frontmatter.html

625 words

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Re: Discussion Forum Assignment

by Francis Oirouyame - Wednesday, 22 November 2023, 10:50 AM

One of the core ideas in mathematics, set theory, has many practical applications, and analyzing consumer behaviour in a grocery shop is one instance of its significance. According to details around Kenneth H. Rosen (2012), Set Theory can be used by the store to identify which customers buy things from several categories by first creating sets of customers who buy items from different categories and then locating the intersection of these sets. In addition to assisting the shop in understanding consumer preferences, this study can help with marketing, product positioning, and inventory control decisions.

Let's construct three sets, A, B, and U, in order to further address the discussion forum unit 1. Consider the following: A is a set of customers that buy fruits (bananas, strawberries, apples, and oranges); B is a set of customers that buy veggies (carrots, broccoli, spinach, and tomatoes); and U is the universal set of all potential grocery store items:

i. A ∪ B: The combination of A and B signifies the group of consumers who buy fruits, vegetables, or both. It contains every element from both sets in one duplicate copy.

ii. A ∩ B: The group of consumers who buy both fruits and vegetables is represented by the intersection of A and B. Only the components shared by both sets are included.

iii. (A ∩ B) ∪ U: This denotes the group of consumers who buy produce as well as any other products from the grocery shop. Together with any extra components from the universal set U, it consists of every element that lies at the intersection between A and B.

iv. The power set of A: The set of all possible subsets of A, including the empty set and the set itself, is represented by the power set of a set A, or P(A). In this instance, every possible combination of fruits (including the empty set and the set A itself) would be included in the power set of A.

v. A': All of the elements that are not in set A are represented by A', which is the complement of set A. In this instance, the group of customers who don't buy fruits would be represented by A'.

vi. ∅ ∩ B: Since there are no elements in common between set B and the empty set (∅), the intersection of the two reflects the empty set.

vii. A × B: Every possible ordered pair formed from the elements of A and B is represented by the Cartesian product of sets A and B. A × B in this instance would stand for every possible mix of fruits and vegetables.

viii. A-B: The elements that are in A but not in B are represented by the set difference of A and B, or A-B. A through B would stand for the fruits in this scenario that aren't veggies.

ix. (A-B) ∪ (B-A): This denotes the collection of components that are either part of A but not of B, or part of B but not of A. It would stand for both the veggies and the fruits that are not vegetables in this instance.

x. For A and B, a De Morgan identity is:

A' ∩ B' = (A ∪ B)'

According to this identity, the intersection of the complements of A and B equals the complement of the union of sets A and B. Stated differently, it indicates that the elements that do not form the union of A and B are those that do not belong to either A or B.

In conclusion, because it offers a mathematical framework for examining and comprehending various data sets and their interactions, set theory is significant in the actual world. Set theory can be applied to a grocery shop to analyse customer purchasing patterns and identify the best-selling products across several categories. In order to get important insights, it also permits the operation and modification of sets. Better decision-making and analysis are made possible by the ability to apply the ideas and methods of set theory to a variety of real-world situations.

References:

Kenneth H. Rosen. (2012). ***Discrete Mathematics and Its Applications***. McGraw-Hill Education. Retrieved November 20, 2023, from http://103.62.146.201:8081/jspui/bitstream/1/9070/1/Discrete%20Mathematics%20Applications%20%28%20PDFDrive%20%29.pdf

696 words

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Re: Discussion Forum Assignment

by Emad Shawky Ellamsy - Wednesday, 22 November 2023, 10:25 AM

Hello Hania,

Your explanation of set theory operations using sets A, B, and U is clear, concise, and accurate, showcasing a strong understanding of the subject. Let's delve into the specifics:

Union (A ∪ B): Your explanation of the union of sets A and B is spot on. You correctly identified that the union includes all elements from both sets without repetition. This is a fundamental concept in set theory and you've articulated it well.

Intersection (A ∩ B): You've accurately noted that the intersection of sets A and B is an empty set, as they have no common elements. Understanding and identifying when sets have no elements in common is crucial in set operations, and you've done this perfectly.

Union with Universal Set ((A ∩ B) ∪ U): Your explanation here is excellent. You clearly understand how the intersection (or lack thereof) between two sets interacts with the universal set. This shows a deeper level of comprehension of set theory.

Power Set of A: You correctly described the power set of A, including all possible subsets. The power set concept is not always easy to grasp, and your explanation makes it accessible.

Complement of A (A'): Your identification of the complement of set A is accurate. You've successfully shown an understanding of what elements belong to the complement of a set in relation to the universal set.

Empty Set Intersection (∅ ∩ B): You correctly stated that the intersection of any set with an empty set is the empty set itself. This fundamental concept is often misunderstood, so it's great to see it correctly applied.

Cartesian Product (A × B): Your explanation of the Cartesian product is precise and shows a solid understanding of this concept. Demonstrating the Cartesian product with clear examples is key to understanding this part of set theory.

Set Difference (A - B): You've correctly explained the concept of set difference. This is an important aspect of set theory, especially in understanding how sets relate to each other.

Union of Set Differences ((A - B) ∪ (B - A)): Your explanation of this concept is clear and accurate. This is a more complex operation, and you've managed to simplify it effectively.

De Morgan's Identity: Lastly, your reference to De Morgan's laws and the approach to prove it is commendable. This shows not only your understanding of set operations but also your ability to relate these concepts to broader mathematical principles.
405 words

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Re: Discussion Forum Assignment

by Emad Shawky Ellamsy - Wednesday, 22 November 2023, 10:22 AM

Hi Siarhei,

Your post demonstrates a clear and comprehensive understanding of set theory, which is impressive. You have not only correctly defined and explained each operation but have also applied them effectively to the given sets.

Union and Intersection: Your explanation of the union (A ∪ B) and intersection (A ∩ B) operations is precise. You've aptly noted that the intersection of two mutually exclusive sets (even and odd numbers in this case) is the empty set, a fundamental concept in set theory.

Universal Set and Operations: The way you've explained the universal set U and its interaction with sets A and B in operations like (A ∩ B) ∪ U is noteworthy. Your approach to illustrating these concepts with practical examples enhances the clarity of your explanation.

Power Set of A: Your detailed enumeration of the power set of A shows a deep understanding of the concept. The power set is a complex topic, and your thorough approach makes it more accessible.

Complement of A (A’): Your explanation of the complement of set A (A') is accurate and well-articulated. Understanding the relationship between a set and its complement is crucial, and you've done an excellent job explaining this.

Empty Set Intersections: You correctly identified that the intersection of any set with an empty set results in an empty set. This is a key principle in set theory, and you've explained it well.

Cartesian Product (A × B): Your demonstration of the Cartesian product shows a solid grasp of this concept. This operation is often tricky to visualize, but your explanation makes it more understandable.

Set Difference (A - B): You've accurately explained the set difference and its implications in the context of sets A and B. This is a crucial aspect of set operations, and you've handled it well.

Union of Set Differences ((A - B) ∪ (B - A)): This section of your post effectively explains a more complex operation involving set differences and their union. Your clarity in explaining this topic is commendable.

De Morgan's Identity: Lastly, your proof of De Morgan's identity is logically sound and well-structured. You've not only stated the law but also provided a clear, step-by-step proof, which is essential for understanding such identities.
371 words

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Re: Discussion Forum Assignment
by Emad Shawky Ellamsy - Wednesday, 22 November 2023, 10:19 AM

Hello Mohamed,

Firstly, I must say your approach to explaining various set operations is commendable. Your explanation is both thorough and accurate, which is crucial in understanding these fundamental concepts in set theory.

Union (A ∪ B): You've correctly identified the elements in A ∪ B, demonstrating a clear understanding of the union of sets. This is an important aspect of set theory and your explanation makes it easy to grasp.

Intersection (A ∩ B): Your observation that A and B have no common elements, resulting in an empty set, is spot on. This is a key concept, and you've explained it very well.

Union with Universal Set ((A ∩ B) ∪ U): Your explanation here is excellent. It shows your deep understanding of how the intersection of sets interacts with the universal set.

Power Set of A: This is a concept that often confuses students, but you've explained it clearly and correctly listed all the subsets of set A. Your comprehensive list demonstrates a strong grasp of the power set concept.

Complement of A (A'): You've accurately identified the elements in the complement of A. Understanding the concept of complement sets is crucial in set theory, and you've nailed it.

Empty Set Intersection (∅ ∩ B): You've correctly stated that the intersection of any set with an empty set is the empty set itself. This fundamental concept is sometimes overlooked, so it's great to see you include it.

Cartesian Product (A × B): Your explanation and enumeration of the Cartesian product show a thorough understanding of this concept, which is essential in advanced mathematics.

Set Difference (A - B): You've correctly identified the set difference, which is a critical concept in understanding how sets relate to each other.

Union of Set Differences ((A - B) ∪ (B - A)): This is a more complex concept, and you've explained it very well, showing your ability to handle more advanced topics in set theory.

De Morgan's Identity: Lastly, your reference to De Morgan's laws and their application in set theory is an excellent inclusion. This shows not only your understanding of set operations but also your ability to relate these concepts to broader mathematical principles.
364 words

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Re: Discussion Forum Assignment
by Emad Shawky Ellamsy - Wednesday, 22 November 2023, 10:07 AM

Hey everyone, I hope you're doing well! I wanted to share with you some insights into set theory and its practical applications. It's really fascinating and can help us in many situations – even in something as ordinary as going to the grocery store!

Picture yourself in a big grocery store, filled with all sorts of items that fall into different categories – fruits, vegetables, dairy, bakery goods, and so on. Now, imagine that we want to analyze what products shoppers buy the most in each category. Sounds like quite the task, right? But this is where set theory comes to our rescue!

We'll start by creating three sets: A, B, and U, and filling them with some random elements – your favorite letters, numbers, or anything else you like! For this example, let's go with: A = {x, y, z, w}, B = {5, 6, 7, 8}, and U = {x, y, z, w, 5, 6, 7, 8, apples, oranges, bananas}.

Let's take each of these operations one at a time and see what sort of magic they can conjure:

i. A ∪ B: The union of sets A and B. This simply brings together all the elements from both A and B. So, if we combined our sets A and B, we'd get {x, y, z, w, 5, 6, 7, 8}.

ii. A ∩ B: This is the intersection of our sets A and B, showing which elements they have in common. In this case, it would be the empty set (∅) – A and B don't share any elements.

iii. (A ∩ B) ∪ U: This one's a bit more complex. Here, we're taking the union of the intersection of sets A and B with the universal set U. Since A and B don't have any common elements their intersection is empty, so we'll end up with just U -- {x, y, z, w, 5, 6, 7, 8, apples, oranges, bananas}.

iv. The Power set of A: This is all the possible subsets we could make from set A. In our example, we've got quite a few possibilities: {{∅}, {x}, {y}, {z}, {w}, {x, y}, {x, z}, {x, w}, {y, z}, {y, w}, {z, w}, {x, y, z}, {x, y, w}, {x, z, w}, {y, z, w}, {x, y, z, w}}.

v. A’: This one's the complement of set A – it's everything that's in our universal set U but not in A, which in our case is {5, 6, 7, 8, apples, oranges, bananas}.

vi. ∅∩B: Here, we're looking at the intersection of an empty set with set B, which of course, gives us another empty set.

vii. A × B: This is the Cartesian product of sets A and B. Every element from set A gets paired with each from B, resulting in a set of all possible pairs: {(x, 5), (x, 6), (x, 7), (x, 8), (y, 5), (y, 6), (y, 7), (y, 8), (z, 5), (z, 6), (z, 7), (z, 8), (w, 5), (w, 6), (w, 7), (w, 8)}.

viii. A - B: This operation presents us the elements that exist in set A but not in B. Since A and B share no common elements, A - B results in {x, y, z, w}.

ix. (A – B) ∪ (B – A): Here, we're uniting the set difference of A and B with the set difference of B and A, spanning all elements in either. Again in our case, they'll result in {x, y, z, w} as there are no shared elements between A and B.

x. As we conclude our adventure, let us embark upon proving one of the illustrious De Morgan identities for sets A and B. Allow me to present the De Morgan identity of set complementation:

(A ∪ B)' = A' ∩ B'

To prove this identity, we shall start by assuming an arbitrary element x. If x belongs to the complement of the union of sets A and B, denoted as (A ∪ B)', it implies that x does not belong to the union of sets A and B.

By the De Morgan identity, we know that x does not belong to A and x does not belong to B. Hence, x belongs to the complement of set A, denoted as A', and x belongs to the complement of set B, denoted as B'.

Therefore, we can conclude that any element x belonging to (A ∪ B)' also belongs to A' ∩ B'. This proves the De Morgan identity (A ∪ B)' = A' ∩ B'.

References:

Doerr, A., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). licensed under CC BY-NC-SA.https://my.uopeople.edu/pluginfile.php/1812402/mod_book/chapter/475429/Doerr_Text.pdf

Mathispower4u. (2022, June 14). Determine the union, intersection, and difference of two set given as lists [Video]. YouTube.

Mathispower4u. (2022, June 14). De Morgan’s laws with venn diagrams [Video]. YouTube.

Khan Academy. (n.d.). Set notation. Retrieved on November 17, 2023, from https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-equations-and-inequalities/cc-6th-solutions-to-inequalities/a/set-notation.

811 words

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Re: Discussion Forum Assignment

by Angelo Graser - Wednesday, 22 November 2023, 9:56 AM

Create three sets A, B having 4 elements in each, and U, a Universal set of any possible number of elements of your interest. (For example, you can consider the sets A = {a, b, c, d}, B = {1, 2, 3, 4} and U = {a, b, c, d, 1, 2, 3, 4, apples, mangoes, avocados}.

A = {3, a, 6, b}
B = {9, b, 6, c}
U = {3, a, 6, b, 9, c, 12, d, 15, e}

Then explain the answers to the following questions to your peers:
i. A ∪ B
This is the union of both A and B and would represent all the elements that are in A or B or both A and B. Repeated elements are not added.
The answer to this is:
A ∪ B = {3, 6, 9, a, b, c}
(Mathispower4u. 2022a)

ii. A ∩ B
This is the intersection of A and B. It represents elements that are in both set A and set B.
The answer to this is:
A ∩ B = {6, b}
(Mathispower4u. 2022a)

iii. (A ∩ B) ∪ U
This is the intersection of set A and set B (only elements that are found in both sets) and then the union of that with the Universe set U (The elements within the defined universe are added with the product of the intersection of A and B).
The answer to this is:
(A ∩ B) ∪ U = {3, a, 6, b, 9, c, 12, d, 15, e}
The breakdown of this is:
(A ∩ B = {6, b}) ∪ U = {3, a, 6, b, 9, c, 12, d, 15, e}
(Mathispower4u. 2022a)

iv. The Power set of A.
This would be the set of all subsets of A. This is the inclusion of all kinds of sets that would be in A.
The answer to this is:
P(A) = {{3}, {a}, {6}, {b}, {3, a}, {3, 6}, {3, b}, {a, 6}, {a, b}, {6, b}, {3, a, 6, b}}

v. A’
This is the complement of A. This would represent all elements that are not elements of A. This would also take into account the defined universe set U.
The answer to this would be
A’ = {9, c, 12, d, 15, e}
(Mathispower4u. 2022a)

vi. ∅∩B
This is the intersection of the empty set ∅ and set B. The empty set can be considered to always be in every other set.
The answer to this is:
∅∩B = {}
(Mathispower4u. 2022a)

vii. A × B
This is the Cartesian product of set A and set B. This means that the answer would be a set of ordered pairs of one element from A and one element from B.
The answer to this is:
A × B = {(3, 9), (3, b), (3, 6), (3, c), (a, 9), (a, b), (a, 6), (a, c), (6, 9), (6, b), (6, 6), (6, c), (b, 9), (b, b), (b, 6), (b, c)}
(Mathispower4u. 2022d)

viii. A-B
This the set A minus set B. This represents a set of elements that are in set A that are also not in set B. An example of this could be a ‘new’ set of A where its elements also found in set B are removed.
The answer to this is:
A-B = {3, a}
(Mathispower4u. 2022a; Mathispower4u. 2022c)

ix. (A − B) ∪ (B − A)
This is the equation of set A minus set B and the union of set B minus set A.
The answer to this is:
(A − B) ∪ (B − A) = {3, a, 9, c}.
The Breakdown of this is:
(A – B = {3, a}) ∪ (B – A = {9, c}) = {3, a, 9, c}
(Mathispower4u. 2022a; Mathispower4u. 2022c)

x. Prove any one De Morgan identity for A and B.
To prove one of the De Morgan identity we can use De Morgan’s First law (AUB)' = A'∩B'. This states that the complement of the union of set A and B is equal to the complement of set A intersecting the complement of set B.
The breakdown of the equation (AUB)' = A'∩B' is:
(AUB)' = ({3, a, 6, b} U {9, b, 6, c} = {3, 6, 9, a, b, c})' = {12, d, 15, e}
A'∩B' = ({3, a, 6, b}' = {9, c, 12, d, 15, e}) ∩ ({9, b, 6, c}' = {3, a, 12, d, 15, e}) = {12, d, 15, e}
(AUB)' = A'∩B'
(Mathispower4u. 2022b)

Words: 383
References:
GitMind - EN. (2020, November 11). How to draw a Venn diagram? [Video]. YouTube.
Mathispower4u. (2022a, June 11). Introduction to sets and set notation [Video]. YouTube.
Mathispower4u. (2022b, June 14). De Morgan’s laws with venn diagrams [Video]. YouTube.

Mathispower4u. (2022c, June 14). Determine the union, intersection, and difference of two set given as lists [Video]. YouTube.
Mathispower4u. (2022d, June 14). The cartesian product of two sets [Video]. YouTube.

825 words

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Re: Discussion Forum Assignment

by Ahmad Abdullah - Wednesday, 22 November 2023, 9:16 AM

I have created three sets A, B, and U as follows:

Set A = {red, blue, green, yellow}

Set B = {circle, square, triangle, pentagon}

Universal set U = {red, blue, green, yellow, circle, square, triangle, pentagon, apple, orange, banana, grape}

Now, I will explain the answers to the questions using these sets:

i. A ∪ B (Union of A and B):

A ∪ B = {red, blue, green, yellow} ∪ {circle, square, triangle, pentagon} = {red, blue, green, yellow, circle, square, triangle, pentagon}

This set contains all the elements from both sets A and B, without any repetition.

ii. A ∩ B (Intersection of A and B):

A ∩ B = {red, blue, green, yellow} ∩ {circle, square, triangle, pentagon} = ∅

This set is empty, because there are no elements that are common to both sets A and B.

iii. (A ∩ B) ∪ U (Union of intersection of A and B with U):

(A ∩ B) ∪ U = (∅ ∪ {red, blue, green, yellow, circle, square, triangle, pentagon, apple, orange, banana, grape}) = {red, blue, green, yellow, circle, square, triangle, pentagon, apple, orange, banana, grape}

This set is equal to the universal set U, because the union of an empty set with any other set is the same as the other set.

iv. Power set of A:

Power set of A (P(A)) = {{}, {red}, {blue}, {green}, {yellow}, {red, blue}, {red, green}, {red, yellow}, {blue, green}, {blue, yellow}, {green, yellow}, {red, blue, green}, {red, blue, yellow}, {red, green, yellow}, {blue, green, yellow}, {red, blue, green, yellow}}

The power set contains all possible subsets of set A, including the empty set and A itself. There are 2^4 = 16 subsets in total, because each element can be either included or excluded in a subset.

v. A' (Complement of A):

A' = U - A = {circle, square, triangle, pentagon, apple, orange, banana, grape}

This set consists of all elements in the universal set U that are not in set A.

vi. ∅ ∩ B (Intersection of empty set with B):

∅ (empty set) ∩ B = ∅

The intersection with an empty set results in an empty set.

vii. A × B (Cartesian product of A and B):

A × B = {(red, circle), (red, square), (red, triangle), (red, pentagon), (blue, circle), (blue, square), (blue, triangle), (blue, pentagon), (green, circle), (green, square), (green, triangle), (green, pentagon), (yellow, circle), (yellow, square), (yellow, triangle), (yellow, pentagon)}

This set contains all ordered pairs where the first element is from set A and the second element is from set B. There are 4 × 4 = 16 pairs in total, because each element in A can be paired with each element in B.

viii. A - B (Set difference of A and B):

A - B = {red, blue, green, yellow}

This set includes elements that are in set A but not in set B. In this case, it is equal to set A, because none of the elements in A are in B.

ix. (A - B) ∪ (B - A) (Symmetric difference of A and B):

(A - B) ∪ (B - A) = ({red, blue, green, yellow} ∪ {circle, square, triangle, pentagon}) = {red, blue, green, yellow, circle, square, triangle, pentagon}

This set consists of elements that are in either A or B but not in both. In this case, it is equal to the union of A and B, because there are no elements that are in both A and B.

x. De Morgan's Law (for A and B):

De Morgan's Law states that (A ∪ B)′ = A′ ∩ B′.

Let's prove it:

(A ∪ B)′ = U - (A ∪ B) = U - {red, blue, green, yellow, circle, square, triangle, pentagon} = {apple, orange, banana, grape}

A′ ∩ B′ = (U - A) ∩ (U - B) = {circle, square, triangle, pentagon, apple, orange, banana, grape} ∩ {red, blue, green, yellow, apple, orange, banana, grape} = {apple, orange, banana, grape}

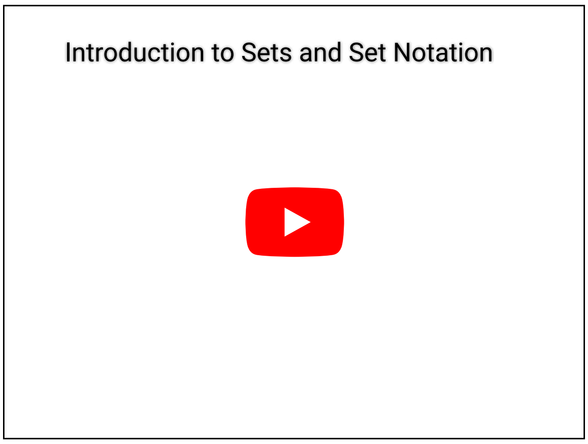
Hence, (A ∪ B)′ = A′ ∩ B′.

References:

Mathispower4u. (2022c, June 14).

[Video]. YouTube.

Mathispower4u. (2022a, June 11).



[Video]. YouTube.

Levin, O. (2021). *Discrete mathematics: An open introduction* (3rd ed.). licensed under CC 4.0

Doerr, A., & Levasseur, K. (2022). *Applied discrete structures* (3rd ed.). licensed under CC BY-NC-SA

734 words

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Re: Discussion Forum Assignment

by Hania Rizwana - Wednesday, 22 November 2023, 4:09 AM

Hello Lu,
Hope you are doing well

Great job on your discussion forum post! Your explanations are clear and concise, making it easy to understand the concepts of set theory in the context of your example. It's also wonderful that you provided specific examples for each question, which helps to solidify understanding.

Best regards
Hania
55 words

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Re: Discussion Forum Assignment

by Hania Rizwana - Wednesday, 22 November 2023, 4:00 AM

Hello Olotu,
Hope you are doing well

Great job on your discussion forum post! You have explained the concepts of set theory and the answers to the given questions clearly and concisely. I especially liked how you provided step-by-step explanations for each question, making it easy to understand. Additionally, your proof of De Morgan's Law was well-presented and effectively demonstrated the concept.

Keep up the good work!

Best regards
Hania
70 words

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Re: Discussion Forum Assignment

by Hania Rizwana - Wednesday, 22 November 2023, 3:56 AM

Hello Jacqueline!
Hope you are doing well

I found your discussion forum post on set theory to be well-structured and informative. Your explanations of the concepts and the answers to the questions were clear and easy to understand. It is evident that you have a good understanding of set theory and its applications.

Overall, your post was well-written, informative, and met the requirements of the assignment. It was a pleasure reading your discussion. Good job!

Best regards,
Hania
78 words

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Re: Discussion Forum Assignment

by Lu Liu - Tuesday, 21 November 2023, 11:04 PM

You did a great job explaining them. Your definitions are clear, concise, and showcase a strong understanding of the key concepts
21 words

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Re: Discussion Forum Assignment
by Lu Liu - Tuesday, 21 November 2023, 11:03 PM

You did a great job explaining them. Your definitions are clear, concise, and showcase a strong understanding of the key concepts
21 words

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Re: Discussion Forum Assignment
by Lu Liu - Tuesday, 21 November 2023, 11:03 PM

You did a great job explaining them. Your definitions are clear, concise, and showcase a strong understanding of the key concepts
21 words

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Re: Discussion Forum Assignment
by Jacqueline Falcone - Tuesday, 21 November 2023, 8:16 PM

Set A: 4,5,6,7
Set B: 8,9,10,11
Universal set: 4,5,6,7,8,9,10,11,12,13
i.A ∪ B (Union of A and B): The union of two sets A and B, denoted as A ∪ B, is the set that contains all the elements that are in either A or B or both.
In this case, A ∪ B = {4,5,6,7,8,9,10,11}.

ii.A ∩ B (Intersection of A and B): The intersection of two sets A and B, denoted as A ∩ B, is the set that contains all the elements that are common to both A and B. In this case, A ∩ B = ∅ (empty set) since there are no common elements between A and B.

iii.(A ∩ B) ∪ U (Union of the intersection of A and B with U): First, we find the intersection of A and B, which is ∅. Then, we take the union of ∅ with U, which results in U itself. Therefore, (A ∩ B) ∪ U = U.

iv.Power set of A: The power set of a set A, denoted as P(A), is the set that contains all possible subsets of A, including the empty set and A itself. In this case, the power set of A is P(A) = {{}, {4}, {5}, {6}, {7}, {4, 5}, {4, 6}, {4, 7}, {5, 6}, {5, 7}, {6, 7}, {4, 5, 6}, {4, 5, 7}, {4, 6, 7}, {5, 6, 7}, {4, 5, 6, 7}}.

v.A' (Complement of A): The complement of a set A, denoted as A', is the set that contains all the elements that are not in A but are in the universal set U. In this case, A' = {8,9,10,11,12,13}.

vi.∅ ∩ B (Intersection of the empty set with B): The intersection of any set with the empty set is always the empty set. Therefore, ∅ ∩ B = ∅.

vii. A × B (Cartesian Product of A and B): The Cartesian product of two sets A and B, denoted as A × B, is the set of all possible ordered pairs where the first element is from A and the second element is from B. In this case, A × B = {(4, 8), (4, 9), (4, 10), (4, 11), (5, 8), (5, 9), (5, 10), (5, 11), (6, 8), (6, 9), (6, 10), (6, 11), (7, 8), (7, 9), (7, 10), (7, 11)}.

viii. A - B (Set difference of A and B): The set difference of two sets A and B, denoted as A - B, is the set that contains all the elements that are in A but not in B. In this case, A - B = {4, 5, 6, 7} since all elements of A are not in B.

ix. (A - B) ∪ (B - A) (Union of the set difference of A and B with the set difference of B and A): First, we find the set difference of A and B, which is A - B = {4, 5, 6, 7}. Then, we find the set difference of B and A, which is B - A = {8, 9, 10, 11}. Finally, we take the union of these two sets, resulting in (A - B) ∪ (B - A) = {4, 5, 6, 7, 8, 9, 10, 11}.

x. De Morgan's Law: One of De Morgan's laws states that the complement of the union of two sets is equal to the intersection of their complements. Mathematically, it can be expressed as (A ∪ B)' = A' ∩ B'. To prove this, we can use the given sets A and B. The complement of A is A' = {8,9,10,11,12,13}, and the complement of B is B' = {4, 5, 6, 7, 12, 13}. The union of A and B is A ∪ B = {4,5,6,7,8,9,10,11}. Taking the complement of the union, we have (A ∪ B)' = {12, 13}. On the other hand, the intersection of A' and B' is A' ∩ B' = {12, 13}. Therefore, (A ∪ B)' = A' ∩ B', proving De Morgan's law in this case.

[Solved] Create three sets A, B having 4 elements in each, and U, a... | CliffsNotes. (n.d.). Www.cliffsnotes.com. Retrieved November 22, 2023, from https://www.cliffsnotes.com/tutors-problems/Math-Other/51933646-Create-three-sets-A-B-having-4-elements-in-each-and-U-a/

698 words

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Re: Discussion Forum Assignment
by Emediong Ukpong - Tuesday, 21 November 2023, 10:21 AM

Hello Marqhawe
The clarity in your explanations, along with the accurate results, showcases a strong understanding of set theory principles. Your demonstration of De Morgan's Law is well-presented, effectively proving that A ∪ B' equals A' ∩ B'. Your engagement with the exercise reflects a commendable grasp of mathematical reasoning and set operations. Great work!
55 words

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Re: Discussion Forum Assignment
by Emediong Ukpong - Tuesday, 21 November 2023, 10:19 AM

Hello Hania, your explanation and demonstration of various set operations are clear and well-organized. You have effectively applied set theory concepts and provided accurate results for each operation. The inclusion of the power set, complement, Cartesian product, and set difference demonstrates a comprehensive understanding of set operations. Your proof of the De Morgan identity is logically presented and contributes to the overall clarity of your response. Well done!
68 words

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Re: Discussion Forum Assignment
by Emediong Ukpong - Tuesday, 21 November 2023, 10:17 AM

Hello Alexandra,
Your demonstration of set operations and the proof of De Morgan's statement are thorough and well-explained. The use of symbols, explanations, and examples makes it easy to follow your reasoning. Your response effectively combines theory and practical applications, providing a comprehensive understanding of set theory concepts. Excellent work!
50 words

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Re: Discussion Forum Assignment
by Emediong Ukpong - Tuesday, 21 November 2023, 10:14 AM

Hello Lu,
Your explanation of set operations and De Morgan's identity is clear and well-organized, providing a comprehensive understanding of each concept. The examples you provide effectively illustrate the outcomes of various set operations. Your work is well-structured and effectively communicates the principles of set theory and De Morgan's identity. Great job!
52 words

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Re: Discussion Forum Assignment
by Emediong Ukpong - Tuesday, 21 November 2023, 10:06 AM

Thank you Mohamed
3 words

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Re: Discussion Forum Assignment
by Hania Rizwana - Tuesday, 21 November 2023, 6:06 AM

A = {red, blue, yellow}

B = {green, orange, pink}

U = {red, blue, yellow, green, orange, pink, purple, black}

i. A ∪ B represents the union of sets A and B, which includes all the elements that are in either A or B, or both. In this case, A ∪ B = {red, blue, yellow, green, orange, pink}

ii. A ∩ B represents the intersection of sets A and B, which includes all the elements that are common to both sets. In this case, A ∩ B = ∅ (empty set) since there are no common elements between A and B.

iii. (A ∩ B) ∪ U represents the union of the intersection of A and B with the universal set U. In this case, (A ∩ B) ∪ U = {red, blue, yellow, green, orange, pink, purple, black}

iv. The power set of A represents the set of all possible subsets of A. In this case, the power set of A = {{}, {red}, {blue}, {yellow}, {red, blue}, {red, yellow}, {blue, yellow}, {red, blue, yellow}}

v. A' represents the complement of set A, which includes all the elements that are not in A. In this case, A' = {green, orange, pink}.

vi. ∅ ∩ B represents the intersection of the empty set with set B, which will always result in the empty set (∅) regardless of the elements in B.

vii. A × B represents the Cartesian product of sets A and B, which is the set of all possible ordered pairs where the first element comes from A and the second element comes from B. In this case, A × B = {(red, green), (red, orange), (red, pink), (blue, green), (blue, orange), (blue, pink), (yellow, green), (yellow, orange), (yellow, pink)}

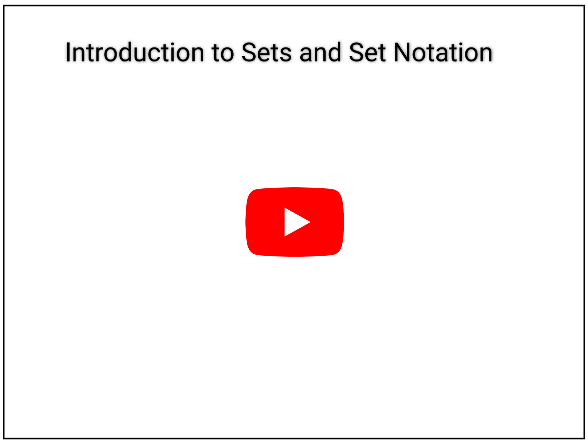
viii. A-B represents the set of elements that are in A but not in B. In this case, A - B = {red, blue, yellow} since B does not contain any elements from A.

ix. (A - B) ∪ (B - A) represents the union of the set of elements that are in A but not in B, and the set of elements that are in B but not in A. In this case, (A - B) ∪ (B - A) = {red, blue, yellow, green, orange, pink}

x. One De Morgan identity states that the complement of the union of two sets is equal to the intersection of their complements. In mathematical notation, it can be expressed as (A ∪ B)' = A' ∩ B'. You can prove this identity by showing that every element in one set is also in the other set

Reference:

Mathispower4u. (2022a, June 11).



[Video]. YouTube.

451 words

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Re: Discussion Forum Assignment

by Alexandra Vovk - Tuesday, 21 November 2023, 2:44 AM

The sets I used in this assignment are :

A (!, @, #, $)

B (Q, W, E, R)

U (!, @, #, $, Q, W, E, R, 1, 2, 3, 4)

Answers for the exercises:

1. (!, @, #, $) ∪ (Q, W, E, R) = (!, @, #, $, Q, W, E, R)
2. (!, @, #, $) ∩ (Q, W, E, R) = None
3. (!, @, #, $, Q, W, E, R, 1, 2, 3, 4)
4. In mathematics, the power (or cardinality) of a set refers to the number of elements in that set (Doerr & Levasseur, 2022). Therefore the power of set A is 4.
5. In set theory, the complement of a set A, denoted A′, is the set of all elements that are in the universal set but not in A (Doerr & Levasseur, 2022). Therefore the solution is: (Q, W, E, R, 1, 2, 3, 4)
6. ∅ ∩ (Q, W, E, R) =∅
7. (!, @, #, $) X (Q, W, E, R) = {(!,Q),(!,W),(!,E),(!,R),(@,Q),(@,W),(@,E),(@,R),(#,Q),(#,W),(#,E),(#,R),($,Q),($,W),($,E),($,R)} = 16 elements
8. (!, @, #, $) - (Q, W, E, R) = (!, @, #, $)
9. (A-B) ∪ (B-A) = A ∪ B = (!, @, #, $, Q, W, E, R, 1, 2, 3, 4)
10. In this exercise, we will prove the following De Morgan statement: (A ∪ B)′ = A′ ∩ B′
    Suppose we choose an element (let's call is y) that belongs in the set (A ∪ B)′
    Then: y is in (A ∪ B)′ and y is not in (A ∪ B)
    Therefore: y is in A and y is in B
    Then: y is not in A and y is not in B
    When writing it down with its symbols we see that y equals A′ ∩ B′
    Now, comparing this with the right side (A ∪ B)′, we see that they are the same.

References

Doerr, A., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). licensed under CC BY-NC-SA

325 words

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Re: Discussion Forum Assignment

by Lu Liu - Monday, 20 November 2023, 9:46 PM

A={2,4,6,8}
B={1,3,5,7}
U={1,2,3,4,5,6,7,8,9,10}

A∪B: The union of sets A and B, represented by A∪B, is the amalgamation of all elements that belong to either A or B . It can also be represented as the set of elements that are either in A, in B. Taking the example of A∪B={1,2,3,4,5,6,7,8}.

A∩B : When discussing sets A and B, their intersection is denoted as A∩B. This refers to the set that contains all elements which are present in both A and B. In the instance where there are no common elements shared between A and B, the intersection is represented as an empty set, denoted by {}.

(A∩B)∪U: This is the union of the intersection of A and B with U. Since A∩B={}, the result is U={1,2,3,4,5,6,7,8,9,10}.

Power set of A: The power set for A, which includes {{2}, {4}, {6}, {8}, {2,4}, {2,6}, {2,8}, {4,6}, {4,8}, {6,8}, {2,4,6}, {2,4,8}, {2,6,8}}, is a representation of these subsets.

A′: The complement of set A, represented as A′, is defined as the collection of all items belonging to universal set U that are not included in set A. To illustrate, A′can be expressed as the set comprising of the elements 1, 3, 5, 7, 9, and 10.

∅∩B: The result of the intersection between the empty set and any set B is unequivocally the empty set, ∅.

A×B: The Cartesian product of sets A and B, denoted by A×B, is the set of all possible ordered pairs where the first element is from A and the second element is from B.

A−B: The set difference of A and B, denoted by A−B, is the set of elements that are in A but not in B. In this case, A−B={2,4,6,8}.

(A−B)∪(B−A): This is the union of the set difference of A and B with the set difference of B and A. (A−B)∪(B−A)={1,2,3,4,5,6,7,8}.

Prove any one De Morgan identity for A and B: The complement of the union of A and B is the set of elements that are not contained in A or B. It can be seen that both sides represent the same set of elements and satisfy DeMorgan's identity.

Levin, O. (2021). Discrete mathematics: An open introduction (3rd ed.). licensed under CC 4.0
https://my.uopeople.edu/pluginfile.php/1812402/mod_book/chapter/475429/Levin_Text.pdf
372 words

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Re: Discussion Forum Assignment
by Mohamed Rashed - Monday, 20 November 2023, 12:53 PM

Good work and good examples for this week, I used clear and useful sources, good starts always give success and excellent work for the rest of the coming weeks, all the best
32 words

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Re: Discussion Forum Assignment
by Mohamed Rashed - Monday, 20 November 2023, 12:51 PM

With reference to the supplied sets A, B, and U, your solutions are thorough and show that you have a firm grasp of set operations. You solved the offered problems with effectiveness by utilizing the principles of union, intersection, complement, set difference, Cartesian product, and power set. Furthermore, your demonstration of De Morgan's law for sets A and B demonstrates sound logic and a command of the fundamentals of set theory. All things considered, you've given thorough explanations and accomplished the duties specified in the assignment. Good work!
88 words

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Re: Discussion Forum Assignment
by Mohamed Rashed - Monday, 20 November 2023, 12:50 PM

Your explanations and analysis of set theory procedures are excellent. You have correctly carried out set operations, and the outcomes are consistent with set theory. I think it's a great start to your first week, the selection of sources was good, good luck next weeks.

45 words

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Re: Discussion Forum Assignment

by Mohamed Rashed - Monday, 20 November 2023, 12:47 PM

Siarhei Padabed , your answer appears precise and in-depth! You've used the provided sets A, B, and U to effectively define each set action. In order to answer the above problems, you have correctly used set theory concepts such as unions, intersections, complements, and set differences. Your responses show that you have a solid grasp of De Morgan's identity and set operations. The listed sources are also important for usWell done!

71 words

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Re: Discussion Forum Assignment

by Emediong Ukpong - Monday, 20 November 2023, 12:01 PM

Hello peers,

I've created three sets as follows:
A={x,y,z,w}
B={5,6,7,8}
U={x,y,z,w,5,6,7,8,apples,bananas,oranges}

Looking into the answers for the given questions:

i. A∪B: This represents the union of sets A and B, giving us {x,y,z,w,5,6,7,8}. Every distinctive component from both groups is present.

ii. A∩B: The intersection of sets A and B yields the empty set {} since there are no common elements.

iii. (A∩B)∪U: Taking the intersection of A and B and then combining it with U gives us U itself, as the intersection is an empty set.

iv. The Power set of A: The Power set of A is the set of all subsets of A, including the empty set and A itself. For the given set A, the Power set is {{},{x},{y},{z},{w},{x,y},{x,z},{x,w},{y,z},{y,w},{z,w},{x,y,z},{x,y,w},{x,z,w},{y,z,w},{x,y,z,w}}.

v. A′ : The complement of set A, denoted as A′, would be the elements in the universal set U but not in A. So, A′ = {5,6,7,8,apples,bananas,oranges}.

vi. ∅∩B: The intersection of the empty set with set B results in the empty set ∅.

vii. A×B: This represents the Cartesian product of A and B, giving us all possible ordered pairs {(x,5),(x,6),(x,7),(x,8),(y,5),(y,6),(y,7),(y,8),(z,5),(z,6),(z,7),(z,8),(w,5),(w,6),(w,7),(w,8)}.

viii. A−B: This is the set of elements in A but not in B, resulting in {x,y,z,w}.

ix. (A−B)∪(B−A): This is the symmetric difference of A and B, giving us all elements that are in either A or B but not both. In this case, (A−B)∪(B−A)={x,y,z,w,5,6,7,8}.

x. De Morgan Identity: Let's prove (A∩B)′ =A′∪B′. The union of A and B's complements is the complement of their intersection. (A∩B)′ ={5,6,7,8,apples,bananas,oranges}=A′∪B′

(Doerr & Levasseur, 2022)

Reference

Doerr, A., & Levasseur, K. (2022). *Applied discrete structures*. https://my.uopeople.edu/pluginfile.php/1812402/mod_book/chapter/475429/Doerr_Text.pdf

269 words

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Re: Discussion Forum Assignment

by Maqhawe Ncube - Sunday, 19 November 2023, 7:09 PM

Hi Olotu,

Your response is incredibly detailed and accurate. You've effectively explained each statement by applying the concepts of set theory using the given sets A, B, and U. You've correctly demonstrated the operations of union, intersection, complement, Cartesian product, set difference, and power set. Moreover, your proof of De Morgan's law for sets A and B is rigorous and well-structured, showing a clear understanding of the logic behind the law. Overall, your explanation is comprehensive and demonstrates a solid grasp of set theory principles. Great job!

87 words

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Re: Discussion Forum Assignment

by Maqhawe Ncube - Sunday, 19 November 2023, 7:08 PM

Hi Siarhei.

Your responses are detailed and demonstrate a clear understanding of set operations using the provided sets A, B, and U. You effectively applied union, intersection, complement, set difference, Cartesian product, and the power set concepts to solve the given problems. Additionally, your proof of De Morgan's law for sets A and B showcases logical reasoning and a solid understanding of set theory principles. Overall, you've provided comprehensive explanations and successfully completed the tasks outlined in the assignment. Well done!

81 words

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Re: Discussion Forum Assignment

by Maqhawe Ncube - Sunday, 19 November 2023, 7:06 PM

Hi Mohamed.

Your explanation seems detailed and accurate! You've effectively described each set operation using the given sets A, B, and U. You've correctly applied set theory principles like unions, intersections, complements, and set differences to solve the questions presented. Your answers are thorough and demonstrate a good understanding of set operations and De Morgan's identity. Great job!

58 words

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Re: Discussion Forum Assignment

by Maqhawe Ncube - Sunday, 19 November 2023, 5:43 PM

Hello Everyone, please note my answer for the discussion assignment for this week:

Given sets:

A={q,a,w,e}
B={1,9,0,3}
U={q,a,w,e,1,9,0,3, almonds, cashews, macadamia}

i. A ∪ B (Union of A and B)
A ∪ B ={q,a,w,e,1,9,0,3}

ii. A ∩ B (Intersection of A and B)
A ∩ B ={} (no common elements between A and B)

iii. (A ∩ B) ∪ U (Union of the intersection of A and B with the set U) This operation combines the elements that are common to both sets A and B (which is an empty set in this case) with all elements in the universal set U. Thus, the result is simply the universal set U itself.
(A ∩ B) ∪ U = {q,a,w,e,1,9,0,3, almonds, cashews, macadamia} (since A ∩ B is empty, the result is the same as U)

iv. The Power set of A. (All possible subsets of set A)

The power set of A includes every possible combination of elements that can be formed by taking elements or no elements from set A, including the empty set and the set A itself.
The power set of A, P(A), for A = {q,a,w,e}, would be:
P(A) = {{},{q},{a},{w},{e},{q,a},{q,w},{q,e},{a,w},{a,e},{w,e},{q,a,w},{q,a,e},{q,w,e},{a,w,e},{q,a,w,e}}

v. A′(Complement of A)
A′ = {1,9,0,3, almonds, cashews, macadamia} (elements in U that are not in A)

vi.∅∩B (Intersection of the empty set with set B) When the empty set intersects with any other set, the resulting set will always be empty.
∅∩B results in the empty set {}.

vii. A ×B (Cartesian Product of sets A and B) The Cartesian Product of sets A and B, denoted as A×B, represents a set of all possible ordered pairs where the first element belongs to set A and the second element belongs to set B.
A={q,a,w,e} and ={1,9,0,3}B={1,9,0,3}, A×B would include pairs like (q,1),(q,9),(q,0),(q,3),(a,1),(a,9),(a,0),(a,3),(w,1),(w,9),(w,0),(w,3),(e,1),(e,9),(e,0),(e,3)

viii. A −B (Set Difference of sets A and B) The set difference of sets A and B, denoted as A−B, signifies the elements that are present in set A but not in set B.
A = {q,a,w,e} and B = {1,9,0,3},
A – B = {q,a,w,e}.

ix. (A−B)∪(B−A) (Union of the set differences of A and B)
A − B = {q,a,w,e} and B−A={1,9,0,3}.
The union of these set differences results in {q,a,w,e,1,9,0,3}.

x. Prove any one De Morgan identity for A and B
Let's prove one of De Morgan's laws for sets A and B:
De Morgan's Law states: A∪B=A∩B
Given sets:
A = {q,a,w,e}
B = {1,9,0,3}
U = {q,a,w,e,1,9,0,3, almonds, cashews, macadamia}
1. A∪B (Complement of the union of A and B)
• A∪B = {q,a,w,e,1,9,0,3} (Union of sets A and B)
• A∪B = U − (A∪B) = U − {q,a,w,e,1,9,0,3}
2. A (Complement of A)
• A = U – A = U − {q,a,w,e}
3. B (Complement of B)
• B = U – B = U − {1,9,0,3}
A∩B:
A∩B=({q,a,w,e, almonds, cashews, macadamia})∩({q,a,w,e, almonds, cashews, macadamia})−{1,9,0,3}

References:

1. Doerr, A., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). licensed under CC BY-NC-SA
2. Levin, O. (2021). Discrete mathematics: An open introduction (3rd ed.). licensed under CC 4.0
3. Mathispower4u. (2022a, June 11). Introduction to sets and set notation [Video]. YouTube.
4. Mathispower4u. (2022b, June 14). De Morgan's laws with venn diagrams [Video]. YouTube.
5. Mathispower4u. (2022c, June 14). Determine the union, intersection, and difference of two set given as lists [Video]. YouTube
6. Mathispower4u. (2022d, June 14). The cartesian product of two sets [Video]. YouTube.
7. Mathispower4u. (2022e, June 23). Determine sum of the cardinality of the union and intersection of two sets [Video]. YouTube.
8. Mathispower4u. (2022f, June 23). Determine the greatest and least values of the cardinality of an intersection and union [Video]. YouTube.
9. Mathispower4u. (2022g, June 23). The cardinality of the union of three sets application: TV shows [Video]. YouTube.
629 words

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Re: Discussion Forum Assignment
by Pramila Bajpai (Instructor) - Sunday, 19 November 2023, 10:26 AM

Dear Olotu
Your analysis of set theory operations is thorough and well-explained. Your execution of set operations is accurate, and the results align with the principles of set theory. The inclusion of De Morgan's Law and the step-by-step proof adds an educational layer to your analysis, enhancing the overall quality. The choice of elements in sets A, B, and U, and the subsequent operations, is practical and aids in understanding the concepts in a real-world context. Further you can use your chosen set to verify the De Morgan's Law.
-Dr. Pramila Bajpai
92 words

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Re: Discussion Forum Assignment
by Siarhei Padabed - Sunday, 19 November 2023, 8:20 AM

I agree with Dr. Pramila Bajpai about the De Moran laws, but except that, everything is explained well and used examples are good enough.
24 words

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Re: Discussion Forum Assignment
by Olotu Okikiayo - Sunday, 19 November 2023, 7:51 AM

Let's consider the following sets:
A = {1, 2, 3, 4}
B = {3, 4, 5, 6}
U = {1, 2, 3, 4, 5, 6, 7, 8}

i. A ∪ B (Union of A and B):
The union of sets A and B (A ∪ B) is the set that contains all elements that are in either set A or set B, without any duplicates. In this case:
A ∪ B = {1, 2, 3, 4, 5, 6}

ii. A ∩ B (Intersection of A and B):
The intersection of sets A and B (A ∩ B) is the set that contains all elements that are common to both set A and set B. In this case:
A ∩ B = {3, 4}

iii. (A ∩ B) ∪ U (Union of the intersection of A and B with U):
First, we find the intersection of A and B, which is {3, 4}. Then, we take the union of this intersection with set U. The resulting set is:
(A ∩ B) ∪ U = {1, 2, 3, 4, 5, 6, 7, 8}

iv. The Power set of A:
The power set of a set A is the set of all possible subsets of A, including the empty set and A itself. In this case, the power set of A is:
Power set of A = {{}, {1}, {2}, {3}, {4}, {1, 2}, {1, 3}, {1, 4}, {2, 3}, {2, 4}, {3, 4}, {1, 2, 3}, {1, 2, 4}, {1, 3, 4}, {2, 3, 4}, {1, 2, 3, 4}}

v. A' (Complement of A):
The complement of set A (A') with respect to the universal set U is the set of all elements in U that are not in A. In this case:
A' = {5, 6, 7, 8}

vi. ∅ ∩ B (Intersection of the empty set with B):
The intersection of the empty set (∅) with any set B is always the empty set (∅). Therefore:
∅ ∩ B = ∅

vii. A × B (Cartesian product of A and B):
The Cartesian product of sets A and B (A × B) is the set of all ordered pairs where the first element comes from set A and the second element comes from set B. In this case:
A × B = {(1, 3), (1, 4), (1, 5), (1, 6), (2, 3), (2, 4), (2, 5), (2, 6), (3, 3), (3, 4), (3, 5), (3, 6), (4, 3), (4, 4), (4, 5), (4, 6)}

viii. A - B (Set difference of A and B):
The set difference of set A and set B (A - B) is the set of all elements that are in A but not in B. In this case:
A - B = {1, 2}

ix. (A - B) ∪ (B - A) (Union of the set difference of A and B with the set difference of B and A):
First, we find the set difference of A and B, which is {1, 2}, and then the set difference of B and A, which is {5, 6}. Finally, we take the union of these two sets. The resulting set is:
(A - B) ∪ (B - A) = {1, 2, 5, 6}

x. De Morgan's Law:
One of De Morgan's laws states that the complement of the union of two sets is equal to the intersection of their complements. Let's use sets A and B to prove this:

Complement of (A ∪ B):
The complement of the union of sets A and B is the set of all elements that are not in A or B. This can be written as:
(A ∪ B)' = {x | x ∉ A and x ∉ B}

Intersection of complements:
The intersection of the complements of sets A and B is the set of all elements that are not in A and not in B. This can be written as(A' ∩ B') = {x | x ∉ A and x ∉ B}

To prove De Morgan's law, we need to show that (A ∪ B)' = (A' ∩ B').

Let's consider an arbitrary element x and show that x belongs to either (A ∪ B)' or (A' ∩ B') if and only if it belongs to the other set.

If x ∈ (A ∪ B)', then x ∉ A and x ∉ B. This means that x is not in either set A or set B. Therefore, x ∈ A' and x ∈ B'. Hence, x ∈ (A' ∩ B').

If x ∈ (A' ∩ B'), then x ∈ A' and x ∈ B'. This means that x is not in set A and x is not in set B. Therefore, x ∉ A and x ∉ B. Hence, x ∈ (A ∪ B)'.

Since we have shown that x belongs to either (A ∪ B)' or (A' ∩ B') if and only if it belongs to the other set, we can conclude that (A ∪ B)' = (A' ∩ B'). This demonstrates De Morgan's law for sets A and B.

Reference
Doerr, A., & Levasseur, K. (2022). Applied discrete structures (3rd ed.). licensed under CC BY-NC-SA
858 words

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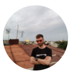

Re: Discussion Forum Assignment
by Siarhei Padabed - Sunday, 19 November 2023, 6:17 AM

Hi everyone,

Let's consider three sets as asked above. Let's A be set of even numbers and B be the set of not even numbers:

A = {2, 4, 6, 8, 10} - |A| = 5 (*cardinality* is 5)

B = {1, 3, 5, 7, 9} - |B| = 5

U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, m, o, r, e, ...} - this is the universal set which includes all objects under consideration, which are our sets A, B and also I added m, o, r, e elements just for example.

Let's try to explain each statement from the assignment:

A ∪ B

What we see here is the union operation. Result of this operation is another set which will be contain all elements from A and B. Let's call it C. So the |C|= 10 because |A| = 5 = |B| so 5 + 5 = 10. As the result our C will look like (in any order since sets are unordered):

C = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

A ∩ B

This is the intersection operation. Result of it are elements that only exists in both sets A and B. In our case A contains even numbers and B contains not even numbers and there are not intersection between them. Result of this operation in our case will be the empty set - ∅.

C = ∅

If we would add element 1 to the set A, we would have

C = {1}

(A ∩ B) ∪ **U**

In this case we perform an union operation between intersection of A and B with the Universal set (U). Result of this operation will be the U, because in our case **A ∩ B =** ∅ and ∅ ∪ **U = U** so:

C = U

This statement will be true even if like in the previous example we add 1 to the set a. Then **A ∩ B = 1** and U contains all elements from A and B.

The Power set of A.

The power set is just simply the set of all subsets of the set A. So to find it we need to go through A, find every subset of it and write down. We should not forget about the empty set, since it's also a subset of A:

P(A) = {∅, {2,4,6,8,10},{2,4,6,10},{2,4,6,8},{2,4,8,10},{2,6,8,10},{4,6,8,10},{2,4,10},{2,4,6},{2,4,8},{2,6,10},{2,6,8},{2,8,10},{4,6,10},{4,6,8},{4,8,10},{6,8,10},{2,10},{2,4},{2,6},{2,8},{4,10},{4,6},{4,8},{6,10},{6,8},{8,10},{10},{2},{4},{6},{8}}

A′

This is the complement of the set and it includes all the elements which are not in A and it will be equal to all the elements of U which are not in A. So:

A′ = U - A = {1, 3, 5, 7, 9, m, o, r, e, ...}

∅∩**B**

This is the intersection of empty set and set B, which will be equal to the empty set (∅). It is because result of intersection are elements that exist in both sets. This there is no elements in the empty set we will have:

∅∩B = ∅

A × B

This operation is known as Cartesian product. Result of it is the set of the **ordered** pairs from both A and B.

A×B = {(2,1),(2,3),(2,5),(2,7),(2,9),(4,1),(4,3),(4,5),(4,7),(4,9),(6,1),(6,3),(6,5),(6,7),(6,9),(8,1),(8,3),(8,5),(8,7),(8,9),(10,1),(10,3),(10,5),(10,7),(10,9)}

A - B

It is the set difference operation and it will return all elements that exist in set A but do not exist in set B. In our example it will be equal to all elements in set a, since none of elements of be are in A

A - B = {2, 4, 6, 8, 10}

(A − B) ∪ **(B − A)**

From previous example we know that A - B = A because none of elements of be are in A. The same B - A = B, and it means that result of this union operation will be all elements in A and B:

(A − B) ∪ (B − A) = A ∪ B = {1,2,3,4,5,6,7,8,9,10}

Prove any one De Morgan identity for A and B.

Let's try to prove the (A ∪ B)′ = A′ ∩ B′

We can do this in two steps:

1. The first is **(A** ∪ **B)′** ⊆ **A′ ∩ B′**. Let's assume that x ∈ (A ∪ B)′. Is means x is not in A ∪ B. So, x is not in A and x is not in B. Therefore, x ∈ A′ and x ∈ B′. Hence, x ∈ A′ ∩ B′.

2. Second - **A′ ∩ B′** ⊆ **(A** ∪ **B)′**. Assume x ∈ A′ ∩ B′. This means x is in both A′ and B′. So, x is not in A and x is not in B. Therefore, x is not in A ∪ B, and it implies that x ∈ (A ∪ B)′.

Now we see **(A** ∪ **B)′** ⊆ **A′ ∩ B′** and **A′ ∩ B′** ⊆ **(A** ∪ **B)′.** Result of it is (A∪B)′ = A′ ∩ B′ which is our De Morgan law we wanted to proof.

References:

Levin, O. (2016). *Discrete mathematics: An Open Introduction*. Createspace Independent Publishing Platform.

Levasseur, K., & Doerr, A. (2012). *Applied discrete structures*. Lulu.com.

845 words

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Re: Discussion Forum Assignment

by Mohamed Rashed - Sunday, 19 November 2023, 4:47 AM

I appreciate your thorough and helpful criticism on my explanation of set theory principles, Dr. Pramila Bajpai. That the explanations, illustrations, and symbolic representations successfully communicated the fundamentals of set operations makes me happy. Regarding the addition of the identification and verification of De Morgan, I appreciate your insight and recommendation. I'll make sure to offer proofs where needed and keep your feedback in mind for future discussions, even if I try my best to provide thorough information.

78 words

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Re: Discussion Forum Assignment

by Pramila Bajpai (Instructor) - Saturday, 18 November 2023, 10:43 PM

Dear Rashed
Your discussion of sets A, B, and U, along with the subsequent responses to various set theory questions, is well-structured and demonstrates a clear understanding of fundamental set operations. Your explanations for each set operation are clear, providing concise definitions and interpretations.
The use of specific examples and symbolic representations enhances the clarity of your responses. Definitions and calculations for set operations are accurate, showcasing a strong grasp of set theory principles. The power set calculation is correct, and the complement of A is accurately determined. The explanation of De Morgan's identity are well presented, but you need to include the verification and porrof of the identity. Rest of your work is good, providing a thorough exploration of set theory concepts. All the best.
-Dr. Pramila Bajpai

129 words

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Re: Discussion Forum Assignment

by Mohamed Rashed - Saturday, 18 November 2023, 9:39 AM

We must specify each set's elements in order to respond to the queries regarding sets A, B, and U. Let's think about the subsequent sets:
{1, 2, 3, 4} is A. {5, 6, 7, 8} is B. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} is the set U.
Let's now discuss the responses to the questions:
i. A ∪ B: The set that contains every element that is in either A or B, or in both, is the union of sets A and B (A ∪ B). A ∪ B = {1, 2, 3, 4, 5, 6, 7, 8} in this instance.

ii. A ∩ B: The set that has every element shared by both A and B is found in the intersection of sets A and B (A ∩ B). A ∩ B = {} (empty set) in this instance since A and B don't share any items.

iii. (A ∩ B) ∪ U: The set that contains all the elements that are in either U, the intersection of A and B, or both is the union of the intersection of sets A and B with set U ((A ∩ B) ∪ U). This means that {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} = (A ∩ B) ∪ U.

iv. Power set of A: The set that includes every possible subset of A, including the empty set and A itself, is called the power set of a set A. {{}, {1}, {2}, {3}, {4}, {1, 2}, {1, 3}, {1, 4}, {2, 3}, {2, 4}, {3, 4}, {1, 2, 3}, {1, 2, 4}, {1, 3, 4}, {2, 3, 4}, {1, 2, 3, 4}} are the power set of A in this instance.

v. A': The set that has all the components from the universal set U but not from A is the complement of set A (A'). Here, A' equals {5, 6, 7, 8, 9, 10}.

vi. ∅ ∩ B: Since the empty set has no elements, the intersection of it with set B (∅ ∩ B) is always the empty set (∅).

vii. A × B: The set of all possible ordered pairs where the first element originates from set A and the second element comes from set B is known as the Cartesian product of sets A and B (A × B). A × B = {(1, 5), (1, 6), (1, 7), (1, 8), (2, 5), (2, 6), (2, 7), (2, 8), (3, 5), (3, 6), (3, 7), (3, 8), (4, 5), (4, 6), (4, 7), (4, 8)} in this instance.

viii. A-B: The set that has all the components in A but not in B is called the set difference of sets A and B (A-B). A - B in this instance equals {1, 2, 3, 4}.

ix. The union of the set differences of A and B and B and A is (A - B) ∪ (B - A). The set that includes all the items that are in either A but not in B, in B but not in A, or in both is ((A - B) ∪ (B - A)). This means that {1, 2, 3, 4, 5, 6, 7, 8} = (A - B) ∪ (B - A).

x. De Morgan's Identity: According to one of De Morgan's identities, the intersection of two sets' complements equals the complement of the union of those sets. Put differently, (A ∪ B)' = A' ∩ B' for sets A and B. Logical reasoning and the concepts of set theory can be used to demonstrate this identity.

Reference

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https://byjus.com/maths/universal-set/

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