

Victoria University of Bangladesh
Final Assessment
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Basic Algebra - MAT 102

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Answer to the question no - 1

Let,

$$A = \{a, b, c, d\}$$

$$B = \{b, d, e, f\}$$

$$C = \{a, c, g, h\}$$

$$\textcircled{i} A - B$$

$$\Rightarrow \{a, b, c, d\} - \{b, d, e, f\}$$

$$= \{a, c\}$$

$$\textcircled{ii} B - C$$

$$\Rightarrow \{b, d, e, f\} - \{a, c, g, h\}$$

$$\Rightarrow \{b, d, e, f\}$$

$$\textcircled{iii} B - B$$

$$\Rightarrow \{b, d, e, f\} - \{b, d, e, f\}$$

$$= \{\emptyset\}$$

OR, Answer to the question no-2 OR

Discuss about De-Morgan's laws there are given below:- The complement of the union of two sets is the intersection of their complements and the complement of the intersection of two sets is the union of their complements. These are called De-Morgan's laws. These are named after the mathematician De-Morgan.

The laws are as follows:

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

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

Examples on De Morgan's law:

① Let $U = \{1, 2, 3, 4, 5, 6\}$, $A = \{2, 3\}$ and $B = \{3, 4, 5\}$

$$\begin{aligned} A \cup B &= \{2, 3\} \cup \{3, 4, 5\} \\ &= \{2, 3, 4, 5\} \end{aligned}$$

$$(A \cup B)' = \{1, 6\}$$

$$\text{Also } A' = \{1, 4, 5, 6\}$$

$$B' = \{1, 2, 6\}$$

$$\begin{aligned} A' \cap B' &= \{1, 4, 5, 6\} \cap \{1, 2, 6\} \\ &= \{1, 6\} \end{aligned}$$

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

Similarly it can be verified that $(A \cap B)' = A' \cup B'$

Answer to the question no- 3

Given series is,

$$62 + 60 + 58 + \dots + 40$$

$$a = 62$$

$$d = 60 - 62$$

$$= -2$$

Last term or n^{th} term

$$l = T_n = 40$$

$$T_n = a + (n-1)d$$

$$\Rightarrow 40 = 62 + (n-1) \times (-2)$$

$$\Rightarrow 40 - 62 = (n-1) \times (-2)$$

$$\Rightarrow -22 = (n-1) \times (-2)$$

$$\Rightarrow (n-1) = \frac{-22}{-2} = 11$$

$$\Rightarrow (n-1) = 11$$

$$\Rightarrow n = 11 + 1$$

$$\therefore n = 12$$

Hence, Sum of 12 terms,

$$S_n = \frac{n}{2} \{2a + (n-1)d\}$$

$$S_{12} = \frac{12}{2} \{2 \cdot 62 + (12-1) \times (-2)\}$$

$$= 6 \{124 - 22\}$$

$$= 6 \times 102$$

$$= 612$$

Answer to the question no-4, or

or,

Discuss about Arithmetic Progression these are given below:- Arithmetic Progression (AP) is a sequence of numbers in which the difference between any two consecutive numbers is a constant value. In other words, arithmetic progression can be defined as "A mathematical sequence in which the difference between two consecutive terms is always a constant."

For example, the series of numbers: 1, 2, 3, 4, 5, 6 --- are in Arithmetic Progression, which has a common difference.

We come across different words like sequence, series, and progression in AP. Now, let's see what each word defines.

(i) Sequence is a finite or infinite list of numbers that follows a certain pattern. For example, 0, 1, 2, 3, 4, 5, ... is the sequence which is an infinite sequence of whole numbers.

(ii) Series is the sum of the elements to which the sequence corresponds. For example, $1 + 2 + 3 + 4 + 5 + \dots$ is the series

of natural numbers. Each number in a sequence or a series is called a term. Here 1 is a term, 2 is a term, 3 is a term, etc.

(iii) Progression is a sequence in which the general term can be expressed using a mathematical formula or the sequence, which uses a mathematical formula that can be defined as Progression.

This is all about arithmetic Progression and its different formulas. understand the meaning of all the terms used in these formulas and focus on how to use them accordingly.