

Question 1;

Mark: 05

If the flood destroys my house or the fire destroys my house, then my insurance company will pay me, convert the following statement in mathematical expression and then write its converse, inverse and contra-positive.

SOLUTION:

Let P, Q and R are proportional

P= the flood destroys my house

Q= the fire destroys my house

R= my insurance company will pay me

By translating English sentences to symbols as

Mathematical Expression is $(P \vee Q) \rightarrow R$

Converse is $R \rightarrow (P \vee Q)$

If my insurance company will pay me then the flood destroy my house or the fire destroy my house

Inverse is $\sim (P \vee Q) \rightarrow \sim R$

If the flood does not destroy my house and the fire does not destroy my house then my insurance company will not pay me. [as $\sim (P \vee Q) = \sim P \wedge \sim Q$]

Contra-positive is $\sim R \rightarrow \sim (P \vee Q)$

If my insurance company will not pay me then the flood does not destroy my house and the fire does not destroy my house. [as $\sim (P \vee Q) = \sim P \wedge \sim Q$]

Question 2;

Marks: 07

With the help of Membership table show that $A \oplus B = (A - B) \cup (B - A)$

SOLUTION:

MEMBERSHIP TABLE:

| A | B | $A \oplus B$ | $(A - B)$ | $(B - A)$ | $(A - B) \cup (B - A)$ |
|---|---|--------------|-----------|-----------|------------------------|
| 1 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 |

Question 3;

Marks: 03

If $A = \{x \mid x^2 + x - 6 = 0\}$ and $B = \{2, -3\}$

Then find $A \cap B$ and $B - A$

SOLUTION:

$A = \{x \mid x^2 + x - 6 = 0\}$ can be written as

$$x^2 + x - 6 = 0$$

$$x^2 + 3x - 2x - 6 = 0$$

$$x(x+3) - 2(x+3) = 0$$

$$(x+3)(x-2) = 0$$

Where $(x+3) = 0$ and $(x-2) = 0$ so the required values are $x = -3$ and $x = 2$

So we can write as

$A = \{-3, 2\}$ and also given that $B = \{2, -3\}$

$$A \cap B = \{-3, 2\} \cap \{2, -3\}$$

$$A \cap B = \{2, -3\}$$

$$B - A = \{2, -3\} - \{-3, 2\}$$

$$B - A = \{\}$$