# Assignment# 01

# MTH#202

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## Question #1 Use symbols to write the logical ----------?

## Solution:

Let A = Alice is a manager

B = Bob is a supervisor

Premise 1: if Alice is a manager, then Bob is not a supervisor.

$A \rightarrow \neg B$

Premise 2: if Bob is a supervisor, then Alice is not a manager.

$B \rightarrow \neg A$

Conclusion: Alice is not a manager, and Bob is not a supervisor.

$\neg A \wedge \neg B$

| A | B | ¬A | ¬B | A→ ¬B | B → ¬A | ¬A ^ ¬B |
|---|---|---|---|---|---|---|
| T | T | F | F | F | F | F |
| T | F | F | T | T | T | F |
| F | T | T | F | T | T | F |
| F | F | T | T | T | T | T |

Hence highlighted row all true so arguments is vailed.

## Question#2: Prove that A\ B = A ∩ Bc.

## Solution:

Let x ∈ A \ B

By the definition of set difference.

x ∈ A and x not belong to B

Since x not belong to B, it follows that x ∈ $B^c$.

Therefore, x ∈ A and x ∈ $B^c$.

so x ∈ $\boldsymbol{A} \cap B^c$.

Thus, A \ B ⊆ A ∩ $B^c$.

Let x ∈ A∩ $B^c$

By the definition of intersection.

x ∈ A and x ∈ $B^c$.

Since x ∈ $B^c$,we have x not belong to B.

Therefore, x ∈ $A$ and x not belong to B.

So, x ∈ $A$ \ B Thus,

$A \cap B^c \subseteq A$ \ B.

Conclusion:

Since we have shown both A \ B ⊆ $A \cap B^c and\ A \cap B^c$ ⊆A \ B,

We conclude that: A \ B = $A \cap B^c$.

## Question#3: Out of 80 students in a ----------?

## Solution:

- C: Students who attended the Coding session.
- D: Students who attended the Data Science session.
- M: Students who attended the Machine Learning session.

|C∩ D| = 30

|D ∩M| = 25

|C ∩M| = 20

|C ∩D ∩M| = 10

|C ∪D ∪M| = |D| +|M| - |C ∩ D| - |D∩ M| - |C∩ M| + |C∩ M| + |C∩ D∩ M|

80 = |C| + |D| + |M| - 30 – 25 –20 +10

2x + |M| = 145 ---------- (1)

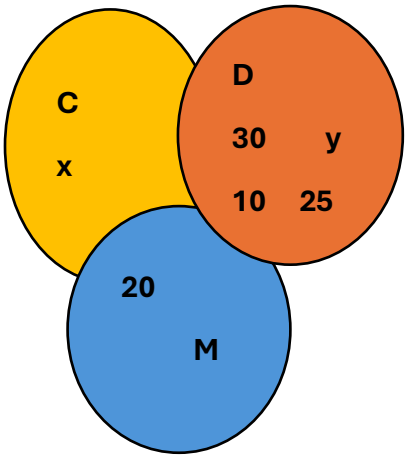
Here

|M| = 20 + 25 – 10 = 35

Put |M| in eq 1

2x + 35 =135

X = 55




**Question#4:** Consider the inequality ----------?

**Solution:** $0 < x \leq \sqrt{2}$

0 < x (which mean x is greater than 0)

$x \leq \sqrt{2}$ (which means x is less than or equal to $\sqrt{2}$).

Negation of $0 < x \; is \; x \leq 0$

Negation of $x \leq \sqrt{2} \; is \; x > \sqrt{2}$

By De Morgan's Laws, the negation of the compound statement $(0 < x \leq \sqrt{2})$ is the "or" combination of the negated parts:

$$x \leq 0 \; or \; x > \sqrt{2}$$

The negation of $0 < x \leq \sqrt{2} \; is$ :

$$x \leq 0 \; or \; x > \sqrt{2} \; is$$

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