

Practice Questions (MTH001)

Lecture No. 3

Implication or conditional statement is denoted by $p \rightarrow q$. It can also be written as:

- “if p then q”
- “p implies q”
- “if p, q”
- “p only if q”
- “p is sufficient for q”
- “not p unless q”
- “q follows from p”
- “q if p”
- “q whenever p”
- “q is necessary for p”

Q1: Let p = It is a heavy rain.

q = There is water in the streets.

$p \rightarrow q$ = IF it is a heavy rain, THEN There is water in the streets.

Write this implication statement $p \rightarrow q$ in the above 10 ways.

Solution:

- 1- IF it is a heavy rain, THEN There is water in the streets.
- 2- it is a heavy rain, implies there is water in the streets.
- 3-IF it is a heavy rain, there is water in the streets.
- 4-It is a heavy rain, only if there is water in the streets.
- 5- It is a heavy rain, is sufficient for, there is water in the streets.
- 6- Not, it is a heavy rain, unless there is water in the streets.
- 7- There is water in the streets follows from, it is a heavy rain.

8- There is water in the streets if it is a heavy rain.

9- There is water in the streets whenever it is a heavy rain.

10- There is water in the streets is necessary for, it is a heavy rain.

Q2: Let p = You are honest.

q = You are truthful.

s = People like you.

r = People trust you.

Translate $p \vee q \rightarrow s \wedge r$ into English statement.

You are honest OR you are truthful implies that people like you AND people trust you.

Q3: Let p = Aslam obeyed his parents.

q = Aslam was successful in his life.

Write the implication, converse, inverse and contra-positive statements.

If p then q implication statement

If q then p Converse

If not p then not q Inverse

If not q then not p . Contrapositive

Q4: Write the negation of the following implication statements:

a) IF Saleem is happy, THEN Saleem gives a party.

$$p \rightarrow q \equiv \sim p \vee q$$

$$\begin{aligned} \sim (p \rightarrow q) &\equiv \sim (\sim p \vee q) \\ &\equiv p \wedge \sim q \end{aligned}$$

b) IF x is greater than 5, THEN x is greater than 3.

c) IF Asif has a library, THEN Asif has many books.

d) IF it is winter season, THEN we wear warm clothes.

e) IF you read a newspaper, THEN you have the up-to-date knowledge.

Practice Questions (MTH001)

Lecture No. 4 and 5

Q1: Write “p is equivalent to q” in symbolic form.

$$P \equiv q$$

Q2: Construct a Truth Table for $(p \leftrightarrow q) \rightarrow (p \leftrightarrow r)$

p	q	r	$p \leftrightarrow q$	$p \leftrightarrow r$	$(p \leftrightarrow q) \rightarrow (p \leftrightarrow r)$
T	T	T	T	T	T
T	T	F	T	F	F
T	F	T	F	T	T
T	F	F	F	F	T
F	T	T	F	F	T
F	T	F	F	T	T
F	F	T	T	F	F
F	F	F	T	T	T

Q3: Show that $\sim(p \oplus q) \rightarrow t$ is a tautology, where t is a tautology.

See page 19 for this question

p	q	$(p \oplus q)$	$\sim(p \oplus q)$
T	T	F	T
T	F	T	F
F	T	T	F
F	F	F	T

Q4: Answer the following:

1. True \rightarrow False False
2. True \oplus False True
3. True \leftrightarrow False False
4. True \rightarrow False False
5. True \oplus \sim False False
6. $\sim(\text{True} \rightarrow \text{False}) \rightarrow \text{True}$ True
7. False \leftrightarrow False True
8. \sim True \wedge True False
9. False \leftrightarrow \sim True True
10. \sim True \leftrightarrow \sim False False