

# Conditional Statements: (Implications, Converse, Inverse, Contrapositive)

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## Q1

Let p: "It rains today."

Let q: "The ground will be wet."

**Implication** ( $p \rightarrow q$ ): If it rains today., then the ground will be wet.

**Converse** ( $q \rightarrow p$ ): If the ground will be wet., then it rains today.

**Inverse** ( $\neg p \rightarrow \neg q$ ): If it is not true that it rains today., then it is not true that the ground will be wet.

**Contrapositive** ( $\neg q \rightarrow \neg p$ ): If it is not true that the ground will be wet., then it is not true that it rains today.

## Q2

Let p: "John studies hard."

Let q: "John will pass the exam."

**Implication** ( $p \rightarrow q$ ): If john studies hard., then john will pass the exam..

**Converse** ( $q \rightarrow p$ ): If john will pass the exam., then john studies hard..

**Inverse** ( $\neg p \rightarrow \neg q$ ): If it is not true that john studies hard., then it is not true that john will pass the exam..

**Contrapositive** ( $\neg q \rightarrow \neg p$ ): If it is not true that john will pass the exam., then it is not true that john studies hard..

## Q3

Let p: "The machine is switched on."

Let q: "The machine will work."

**Implication** ( $p \rightarrow q$ ): If the machine is switched on., then the machine will work..

Converse ( $q \rightarrow p$ ): If the machine will work., then the machine is switched on..

Inverse ( $\neg p \rightarrow \neg q$ ): If it is not true that the machine is switched on., then it is not true that the machine will work..

Contrapositive ( $\neg q \rightarrow \neg p$ ): If it is not true that the machine will work., then it is not true that the machine is switched on..

#### Q4

Let p: "Alice eats healthy food."

Let q: "Alice will stay fit."

Implication ( $p \rightarrow q$ ): If alice eats healthy food., then alice will stay fit..

Converse ( $q \rightarrow p$ ): If alice will stay fit., then alice eats healthy food..

Inverse ( $\neg p \rightarrow \neg q$ ): If it is not true that alice eats healthy food., then it is not true that alice will stay fit..

Contrapositive ( $\neg q \rightarrow \neg p$ ): If it is not true that alice will stay fit., then it is not true that alice eats healthy food..

#### Q5

Let p: "The traffic light turns red."

Let q: "Cars must stop."

Implication ( $p \rightarrow q$ ): If the traffic light turns red., then cars must stop..

Converse ( $q \rightarrow p$ ): If cars must stop., then the traffic light turns red..

Inverse ( $\neg p \rightarrow \neg q$ ): If it is not true that the traffic light turns red., then it is not true that cars must stop..

Contrapositive ( $\neg q \rightarrow \neg p$ ): If it is not true that cars must stop., then it is not true that the traffic light turns red..

#### Q6

Let p: "You work hard."

Let q: "You will achieve success."

Implication ( $p \rightarrow q$ ): If you work hard., then you will achieve success..

Converse ( $q \rightarrow p$ ): If you will achieve success., then you work hard..

Inverse ( $\neg p \rightarrow \neg q$ ): If it is not true that you work hard., then it is not true that you will achieve success..

Contrapositive ( $\neg q \rightarrow \neg p$ ): If it is not true that you will achieve success., then it is not true that you work hard..