

- 4) p : You can take a flight
 q : You buy a ticket

Conjunction: $(p \wedge q)$

You can take a flight and you can buy a ticket

Disjunction: $(p \vee q)$

You can take a flight or you buy a ticket

Conditional: $(p \rightarrow q)$

IF You can take a flight then you buy a ticket

Bidirectional: $(p \leftrightarrow q)$

You can take a flight if and only if you ~~can~~ buy a ticket.

~~alt~~ alt: if you can take a flight it is ~~necc~~ necessary to buy a ticket.

Ques 5) Construct truth table.

- 1) p : $(q \rightarrow \neg p) \vee (\neg p \rightarrow \neg q)$

		I		II			
p	q	$\neg p$	$\neg q$	$q \rightarrow \neg p$	$\neg p \rightarrow \neg q$	$I \vee II$	III
T	T	F	F	T	T	T	
T	F	F	T	T	T	T	
F	T	T	F	T	F	T	
F	F	T	T	F	T	T	

2)

$$Q \equiv (p \vee q) \rightarrow (p \oplus q)$$

		I	II		
p	q	$p \vee q$	$p \oplus q$	$I \rightarrow II$	
T	T	T	F	F	
T	F	T	T	T	
F	T	T	T	T	
F	F	F	F	T	

$$R \equiv (p \vee q) \oplus (p \wedge q)$$

		I	II		
p	q	$p \vee q$	$p \wedge q$	$I \oplus II$	
T	T	T	T	F	
T	F	T	F	T	
F	T	T	F	T	
F	F	F	F	F	

$$S \equiv (p \leftrightarrow q) \vee (\neg p \leftrightarrow q)$$

		(I)	II		
p	q	$\neg p$	$p \leftrightarrow q$	$\neg p \leftrightarrow q$	$I \vee II$
T	T	F	T	F	T
T	F	F	F	T	T
F	T	T	F	T	T
F	F	T	T	F	T

$$T \equiv (p \oplus q) \rightarrow (p \oplus \neg q)$$

		I	II		
p	q	$p \oplus q$	$p \oplus \neg q$	$I \rightarrow II$	
T	T	T	F	F	
T	F	F	T	T	
F	T	F	F	T	
F	F	T	T	T	

if "whenever" \Rightarrow — whenever —
 \uparrow \uparrow
 q p

q	p	q	$\neg q$	$p \oplus q$	$p \oplus \neg q$	$I \rightarrow II$
T	T	T	F	F	T	T
T	F	F	T	T	F	F
F	T	T	F	T	F	F
F	F	F	T	F	T	T

eg: What are the contrapositive, converse and inverse of cond. statement.

1) The home team wins whenever it is raining?

\Rightarrow ~~Contrapositive~~: Let p : it is raining
 q : The home team wins.

because whenever

$q \leftrightarrow p$ is one of the way to express ^{implies}
 cond. statement $p \rightarrow q$ \therefore Original statement
 can be written as $p \rightarrow q$

Original: if it is raining then the home team wins

Contrapositive: $\neg q \rightarrow \neg p$

If home team doesn't win then it is not raining.

Converse: $q \rightarrow p$

if it is raining then home team wins
 then it is raining.

② Inverse: $\neg p \rightarrow \neg q$

if it is not raining then the home team doesn't win.