Note that the statements $\mathbf{p \rightarrow q}$ and $\mathbf{q \rightarrow p}$ are different.

If and only If Statements – These statements are true only when both p and q have the same truth (logical) values.

If ↔ Then		
p	q	p ↔ q
T	T	T
T	F	F
F	T	F
F	F	T

NOT ~ (negation) The "not" is simply the opposite or complement of its original value.

NOT ~ (negation)	
P	~p
T	F
F	T

Note that, the negation is meaningful when used with only one logical proposition. This is not true of the other connectives.

Examples 1.2.3. Write the following statements symbolically, and then make a truth table for the statements.

(i) If I go to the mall or go to the stadium, then I will not go to the gym.

(ii) If the fish is cooked, then dinner is ready and I am hungry.

Solution.

(i) Suppose we set

p = I go to the mall

q = I go to the stadium

r = I will go to the gym

The proposition can then be expressed as "If p or q, then not r," or $(p \vee q) \rightarrow \sim r$.