6. Write down the negation of following compound statements

(i) All rational numbers are real and complex.

Solution:

The given statement is compound statement then components are,

P: All rational numbers are real.

~p: All rational numbers are not real.

q: All rational numbers are complex.

~q: All rational numbers are not complex.

(p ∧ q)= All rational numbers are real and complex.

~ (p ∧ q)=~p v ~q= All rational numbers are neither real nor complex.

(ii) All real numbers are rationals or irrationals.

Solution:

The given statement is compound statement then components are,

P: All real numbers are rational.

~p: All real numbers are not rational.

q: All real numbers are irrational.

~q: All real numbers are not irrational.

(p ∧ q)= All real numbers are rationals or irrationals.

~(p ∧ q)=~p v ~q= All real numbers are neither rationals nor irrationals.

(iii) x = 2 and x = 3 are roots of the Quadratic equation x 2 – 5x + 6 = 0.

Solution:

The given sentence is a compound statement in which components are

p: x = 2 is a root of Quadratic equation $x^2 - 5x + 6 = 0$.

~p: x = 2 is not a root of Quadratic equation $x^2 - 5x + 6 = 0$.

q: x = 3 is a root of Quadratic equation $x^2 - 5x + 6 = 0$.

~q: x = 3 is not a root of Quadratic equation $x^2 - 5x + 6 = 0$.

(p ∧ q)= x = 2 and x = 3 are roots of the Quadratic equation $x^2 - 5x + 6 = 0$.

~ (p ∧ q)=~p v ~q= Neither x = 2 and nor x = 3 are roots of $x^2 - 5x + 6 = 0$

(iv) A triangle has either 3-sides or 4-sides.

Solution:

The given statement is compound statement then components are,

P: A triangle has 3 sides

~p: A triangle does not have 3 sides.

q: A triangle has 4 sides.

~q: A triangle does not have 4 side.

$(p \vee q)$= A triangle has either 3-sides or 4-sides.

$\sim(p \vee q) = \sim p \wedge \sim q$= A triangle has neither 3 sides nor 4 sides.