

Exercise 5(B)

(i) $7x^2 - 9x + 2 = 0$

(iii) $25x^2 - 10x + 1 = 0$

(v) $x^2 - ax - b^2 = 0$

(ii) $6x^2 - 13x + 4 = 0$

(iv) $x^2 + 2\sqrt{3}x - 9 = 0$

(vi) $2x^2 + 8x + 9 = 0$

Solution:

(i) Given quadratic equation, $7x^2 - 9x + 2 = 0$

Here, $a = 7$, $b = -9$ and $c = 2$

So, the Discriminant (D) = $b^2 - 4ac$

$$D = (-9)^2 - 4(7)(2)$$

$$= 81 - 56$$

$$= 25$$

As $D > 0$, the roots of the equation is real and unequal.

(ii) Given quadratic equation, $6x^2 - 13x + 4 = 0$

Here, $a = 6$, $b = -13$ and $c = 4$

So, the Discriminant (D) = $b^2 - 4ac$

$$D = (-13)^2 - 4(6)(4)$$

$$= 169 - 96$$

$$= 73$$

As $D > 0$, the roots of the equation is real and unequal.

(iii) Given quadratic equation, $25x^2 - 10x + 1 = 0$

Here, $a = 25$, $b = -10$ and $c = 1$

So, the Discriminant (D) = $b^2 - 4ac$

$$D = (-10)^2 - 4(25)(1)$$

$$= 100 - 100$$

$$= 0$$

As $D = 0$, the roots of the equation is real and equal.

(iv) Given quadratic equation, $x^2 + 2\sqrt{3}x - 9 = 0$

Here, $a = 1$, $b = 2\sqrt{3}$ and $c = -9$

So, the Discriminant (D) = $b^2 - 4ac$

$$D = (2\sqrt{3})^2 - 4(1)(-9)$$

$$= 12 + 36$$

$$= 48$$

As $D > 0$, the roots of the equation is real and unequal.

(v) Given quadratic equation, $x^2 - ax - b^2 = 0$

Here, $a = 1$, $b = -a$ and $c = -b^2$

So, the Discriminant (D) = $b^2 - 4ac$

$$D = (a)^2 - 4(1)(-b^2)$$

$$= a^2 + 4b^2$$

$a^2 + 4b^2$ is always positive value.

Thus $D > 0$, and the roots of the equation is real and unequal

(vi) Given quadratic equation, $2x^2 + 8x + 9 = 0$

Here, $a = 2$, $b = 8$ and $c = 9$

So, the Discriminant (D) = $b^2 - 4ac$

$$\begin{aligned} D &= (8)^2 - 4(2)(9) \\ &= 64 - 72 \\ &= -8 \end{aligned}$$

As $D < 0$, the equation has no roots.

(i) $4x^2 - (p - 2)x + 1 = 0$

(ii) $x^2 + (p - 3)x + p = 0$

Solution:

(i) $4x^2 - (p - 2)x + 1 = 0$

Here, $a = 4$, $b = -(p - 2)$, $c = 1$

Given that the roots are equal,

So, Discriminant = 0 $\Rightarrow b^2 - 4ac = 0$

$$D = (-(p - 2))^2 - 4(4)(1) = 0$$

$$\Rightarrow p^2 + 4 - 4p - 16 = 0$$

$$\Rightarrow p^2 - 4p - 12 = 0$$

$$\Rightarrow p^2 - 6p + 2p - 12 = 0$$

$$\Rightarrow p(p - 6) + 2(p - 6) = 0$$

$$\Rightarrow (p + 2)(p - 6) = 0$$

$$\Rightarrow p + 2 = 0 \text{ or } p - 6 = 0$$

Hence, $p = -2$ or $p = 6$

(ii) $x^2 + (p - 3)x + p = 0$

Here, $a = 1$, $b = (p - 3)$, $c = p$

Given that the roots are equal,

So, Discriminant = 0 $\Rightarrow b^2 - 4ac = 0$

$$D = (p - 3)^2 - 4(1)(p) = 0$$

$$\Rightarrow p^2 + 9 - 6p - 4p = 0$$

$$\Rightarrow p^2 - 10p + 9 = 0$$

$$\Rightarrow p^2 - 9p - p + 9 = 0$$

$$\Rightarrow p(p - 9) - 1(p - 9) = 0$$

$$\Rightarrow (p - 9)(p - 1) = 0$$

$$\Rightarrow p - 9 = 0 \text{ or } p - 1 = 0$$

Hence, $p = 9$ or $p = 1$