NCERT Solutions For Class 10 Chapter 4 Quadratic Equations Exercise 4.4

Q1. Find the nature of the roots of the following quadratic equations. If the real roots exist, find them.

(i) $\mathbf{2x^2 - 3x + 5 = 0}$

(ii) $3x^2 - 4\sqrt{3}x + 4 = 0$

(iii) $\mathbf{2x^2 - 6x + 3 = 0}$

Ans. (i) $2x^2 - 3x + 5 = 0$

Comparing this equation with general equation $ax^2 + bx + c = 0$,

We get $a = 2$, $b = -3$ and $c = 5$

Discriminant $= b^2 - 4ac = (-3)^2 - 4\ (2)\ (5)$

$= 9 - 40 = -31$

Discriminant is less than 0 which means equation has no real roots.

(ii) $3x^2 - 4\sqrt{3}x + 4 = 0$

Comparing this equation with general equation $ax^2 + bx + c = 0$,

We get $a = 3$, $b = -4\sqrt{3}$ and c = 4

Discriminant $= b^2 - 4ac = \left(-4\sqrt{3}\right)^2 - 4\ (3)\ (4)$

$= 48 - 48 = 0$

Discriminant is equal to zero which means equations has equal real roots.

Applying quadratic $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to find roots,

$$x = \frac{4\sqrt{3} \pm \sqrt{0}}{6} = \frac{2\sqrt{3}}{3}$$

Because, equation has two equal roots, it means

$$x = \frac{2\sqrt{3}}{3}, \frac{2\sqrt{3}}{3}$$

(iii) $2x^2 - 6x + 3 = 0$

Comparing equation with general equation $ax^2 + bx + c = 0$,

We get $a = 2$, $b = -6$, and $c = 3$

Discriminant = $b^2 - 4ac = (-6)^2 - 4$ (2) (3)

$= 36 - 24 = 12$

Value of discriminant is greater than zero.

Therefore, equation has distinct and real roots.

Applying quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to find roots,

$$x = \frac{6 \pm \sqrt{12}}{4} = \frac{6 \pm 2\sqrt{3}}{4}$$

$$\Rightarrow x = \frac{3 \pm \sqrt{3}}{2}$$

$$\Rightarrow x = \frac{3 + \sqrt{3}}{2}, \frac{3 - \sqrt{3}}{2}$$

Q2. Find the value of k for each of the following quadratic equations, so that they have two equal roots.

(i) $2x^2 + kx + 3 = 0$

(ii) $kx(x-2) + 6 = 0$

Ans. (i) $2x^2 + kx + 3 = 0$

We know that quadratic equation has two equal roots only when the value of discriminant is equal to zero.

Comparing equation $2x^2 + kx + 3 = 0$ with general quadratic equation $ax^2 + bx + c = 0$, we get $a = 2$, $b = k$ and $c = 3$

Discriminant $= b^2 - 4ac = k^2 - 4(2)(3) = k^2 - 24$

Putting discriminant equal to zero

$k^2 - 24 = 0 \Rightarrow k^2 = 24$

$\Rightarrow k = \pm\sqrt{24} = \pm 2\sqrt{6}$

$\Rightarrow k = 2\sqrt{6}, -2\sqrt{6}$

(ii) $kx(x-2) + 6 = 0$

$\Rightarrow kx^2 - 2kx + 6 = 0$

Comparing quadratic equation $kx^2 - 2kx + 6 = 0$ with general form $ax^2 + bx + c = 0$, we get $a = k$, $b = -2k$ and $c = 6$

Discriminant $= b^2 - 4ac = (-2k)^2 - 4(k)(6) = 4k^2 - 24k$

We know that two roots of quadratic equation are equal only if discriminant is equal to zero.

Putting discriminant equal to zero

$4k^2 - 24k = 0$

$\Rightarrow 4k(k-6) = 0 \Rightarrow k = 0, 6$

The basic definition of quadratic equation says that

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