

Sol.

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(Affiliated to CBSE up to +2 Level)

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Exercise 4.3

Q.1. Find the roots of the following quadratic equations, if they exist, by the method of completing the square.

(i)
$$2x^2 - 7x + 3 = 0$$

(iii)
$$4x^2 + 4 + 3 = 0$$

(i)
$$2x^2 - 7x + 3 = 0$$

$$x^2 - \frac{7}{2}x + \frac{3}{2} = 0$$

$$\Rightarrow \left\{ x - \frac{1}{2} \left(\frac{7}{2} \right) \right\}^2 - \left(\frac{7}{4} \right)^2 + \frac{3}{2} = 0$$

$$\Rightarrow \left\{x - \frac{7}{4}\right\}^2 - \frac{49}{16} + \frac{3}{2} = 0$$

$$\Rightarrow \left\{ x - \frac{7}{4} \right\}^2 - \frac{49}{16} + \frac{24}{16} = 0$$

$$\Rightarrow \left\{x - \frac{7}{4}\right\}^2 - \frac{25}{16} = 0$$

$$\Rightarrow \left\{ x - \frac{7}{4} \right\}^2 = \frac{25}{16} = \left(\frac{5}{4}\right)^2$$

$$\Rightarrow x - \frac{7}{4} = \pm \frac{5}{4}$$

Case I

When
$$\frac{5}{4}$$
 is +ve, then

$$x - \frac{7}{4} = \frac{5}{4} \Rightarrow x = \frac{5}{4} + \frac{7}{4}$$

$$\Rightarrow x = \frac{12}{4} = 3$$

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

(iv)
$$2x^2 + x + 4 = 0$$

Case II:

When
$$\frac{5}{4}$$
 is +ve, then

$$x - \frac{7}{4} = \frac{5}{4} \Rightarrow x = \frac{5}{4} + \frac{7}{4}$$

$$\Rightarrow x = \frac{12}{4} = 3$$

Case II

When
$$\frac{5}{4}$$
 is +ve, then

$$x - \frac{7}{4} = -\frac{5}{4} \Rightarrow x = -\frac{5}{4} + \frac{7}{4}$$

$$\Rightarrow x = \frac{2}{4} = \frac{1}{2}$$

Thus, required roots are

$$x = 3$$
 and $x = \frac{1}{2}$

Q.2. Find the roots of the following quadratic equations, using the quadratic formula:

(i)
$$2x^2 - 7x + 3 = 0$$

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

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

(iv)
$$2x^2 + x + 4 = 0$$

Sol. (i)
$$2x^2 - 7x + 3 = 0$$

Comparing the given equation with $ax^2 + bx + c = 0$, we have

$$a = 2$$

$$b = -7$$

$$c = 3$$

$$b^2 - 4ac = (-7)^2 - 4(2)(3)$$

$$=49 - 24 = 250$$

Since
$$b^2 - 4ac > 0$$

∴ The given equation has real roots. The roots are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\Rightarrow x = \frac{-(-7) \pm \sqrt{25}}{2(2)}$$

$$=\frac{7\pm5}{4}$$

Taking +ve sign,

$$x = \frac{7+5}{4} = \frac{12}{4} = 3$$

Taking -ve sign,

$$x = \frac{7-5}{4} = \frac{2}{4} = \frac{1}{2}$$

Thus, the roots of the given equation are

$$x = 3 \text{ and } x = \frac{1}{2}$$