Quadratic Equations Ex 14.1 Q5

$$x^2 + x + 1 = 0$$

Now, completing the squares, we get

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

$$\Rightarrow \quad \left(x + \frac{1}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}i\right)^2 = 0$$

$$\Rightarrow \quad \left(x + \frac{1}{2} + \frac{\sqrt{3}}{2}i\right)\left(x + \frac{1}{2} - \frac{\sqrt{3}}{2}i\right) = 0$$

$$\Rightarrow \quad \left(x + \frac{1}{2} + \frac{\sqrt{3}}{2}i\right) = 0 \quad or \quad \left(x + \frac{1}{2} - \frac{\sqrt{3}}{2}i\right) = 0$$

$$\therefore \; x = \frac{-1}{2} + \frac{\sqrt{3}}{2}i, \quad \frac{-1}{2} - \frac{\sqrt{3}}{2}i$$

Quadratic Equations Ex 14.1 Q6

$$4x^2 + 1 = 0$$

$$\Rightarrow \quad (2x)^2 - i^2 = 0 \quad \left[\because i^2 = -1\right]$$

$$\Rightarrow \quad (2x + i)(2x - i) = 0$$

$$\Rightarrow \text{ either } 2x + i = 0 \quad \text{or} \quad 2x - i = 0$$

$$\Rightarrow \quad x = \frac{-i}{2} \quad \text{or} \quad x = \frac{i}{2}$$

$$\therefore \; x = \frac{-i}{2}, \frac{i}{2}$$

Quadratic Equations Ex 14.1 Q7

$$x^2 - 4x + 7 = 0$$

We will apply discriminant rule,

$$x = \frac{-b \pm \sqrt{D}}{2a} \quad \ldots\ldots\ldots\ldots (A)$$

where $D = b^2 - 4ac = (-4)^2 - 4.1.7 = -12$

from $(A)$

$$x = -\frac{(-4) \pm \sqrt{-12}}{2}$$

$$= \frac{4 \pm 2\sqrt{3}i}{2}$$

$$= 2 \pm \sqrt{3}i$$

$\therefore \quad x = 2 + \sqrt{3}i,\ 2 - \sqrt{3}i$

Quadratic Equations Ex 14.1 Q8

$$x^2 + 2x + 2 = 0$$

We will apply discriminant rule,

$$x = \frac{-b \pm \sqrt{D}}{2a} \quad \ldots\ldots\ldots\ldots (A)$$

where $D = b^2 - 4ac$

$= 2^2 - 4.1.2$

$= 4 - 8$

$= -4$

from $(A)$

$$x = \frac{-2 \pm \sqrt{-4}}{2}$$

$$= \frac{-2 \pm 2i}{2}$$

$$= -1 \pm i$$

$\therefore \quad x = -1 + i, \quad -1 - i$

********** END **********