



Exercise 2B

Question 16:

$\sqrt{3}$ and $-\sqrt{3}$ are the zeros of polynomial

$$2x^4 - 3x^3 - 5x^2 + 9x - 3$$

$\therefore (x - \sqrt{3})(x + \sqrt{3}) = x^2 - 3$ will divide the given polynomial completely

Dividing $2x^4 - 3x^3 - 5x^2 + 9x - 3$ by $x^2 - 3$, we get

$$\begin{array}{r}
 2x^2 - 3x + 1 \\
 x^2 - 3 \overline{) 2x^4 - 3x^3 - 5x^2 + 9x - 3} \\
 \underline{2x^4 - 6x^2} \\
 -3x^3 + x^2 + 9x \\
 \underline{-3x^3 + 9x} \\
 + - - 3 \\
 x^2 - 3 \\
 x^2 - 3 \\
 - + \\
 0
 \end{array}$$

$$\begin{aligned}
 \therefore \text{Quotient } q(x) &= 2x^2 - 3x + 1 = 2x^2 - 2x - x + 1 \\
 &= 2x(x - 1) - (x - 1) = (x - 1)(2x - 1)
 \end{aligned}$$

Other zeros of given polynomial are given by

$$q(x) = 0 \Rightarrow (x - 1)(2x - 1) = 0 \therefore x = 1, \frac{1}{2}$$

Hence, zeros of given polynomial are $\sqrt{3}$, $-\sqrt{3}$, 1 , $\frac{1}{2}$

Question 17:

Sum of $3 + \sqrt{2}$ and $3 - \sqrt{2} = (3 + \sqrt{2}) + (3 - \sqrt{2}) = 6$

Product of $(3 + \sqrt{2})$ and $(3 - \sqrt{2})$
 $= (3 + \sqrt{2})(3 - \sqrt{2}) = 9 - 2 = 7$

Polynomial whose zeros are $3 + \sqrt{2}$ and $3 - \sqrt{2}$ is
 $x^2 - (\text{sum of zeros})x + (\text{product of zeros}) = x^2 - 6x + 7$

Dividing $p(x)$ by $x^2 - 6x + 7$

$$\begin{array}{r}
 2x^2 + x - 1 \\
 x^2 - 6x + 7 \overline{) 2x^4 - 11x^3 + 7x^2 + 13x - 7} \\
 \underline{2x^4 - 12x^3 + 14x^2} \\
 -x^3 - 7x^2 + 13x \\
 \underline{-x^3 - 6x^2 + 7x} \\
 -x^2 + 6x - 7 \\
 \underline{-x^2 + 6x - 7} \\
 0
 \end{array}$$

Quotient $= 2x^2 + x - 1$

\therefore Other zeros of polynomial $p(x)$ are also the zeros of $q(x)$

$$\begin{aligned}
 \therefore q(x) &= 2x^2 + x - 1 = 2x^2 + 2x - x - 1 \\
 &= 2x(x + 1) - (x + 1) = (x + 1)(2x - 1)
 \end{aligned}$$

$$q(x) = 0$$

$$\Rightarrow (x + 1)(2x - 1) = 0$$

$$\Rightarrow \text{Either } x + 1 = 0 \text{ or } 2x - 1 = 0$$

$$\Rightarrow \text{Either } x = -1 \text{ or } x = \frac{1}{2}$$

\therefore The zeros of given polynomial $p(x)$ are

$$\frac{1}{2}, -1, (3 + \sqrt{2}) \text{ and } (3 - \sqrt{2})$$

***** END *****