Exercise 2.4

Question 1:

For each of the following, find quadratic polynomial whose sum and product respectively of the zeroes are as given. Also, find the zeroes of these polynomials by factorization.

(i) $-\frac{8}{3}, \frac{4}{3}$ **(ii)** $\frac{21}{8}, \frac{5}{16}$ **(iii)** $-2\sqrt{3}, -9$ **(iv)** $-\frac{3}{2\sqrt{5}}, -\frac{1}{2}$

Answer 1:

(i) Given that, sum of zeroes (S) = $-\frac{8}{3}$

and product of zeroes (P) = $\frac{4}{3}$

∴ Required quadratic expression, $f(x) = x^2 - Sx + P$

$= x^2 + \frac{8}{3}x + \frac{4}{3} = \frac{1}{3}[3x^2 + 8x + 4]$ or $3x^2 + 8x + 4$

Using factorization method,

$3x^2 + 8x + 4$

$= 3x^2 + 6x + 2x + 4$

$= 3x(x + 2) + 2(x + 2) = (x + 2)(3x + 2)$

Hence, the zeroes of $f(x)$ are -2 and $-\frac{2}{3}$.

(ii) Given that, sum of zeroes (S) = $\frac{21}{8}$

and product of zeroes (P) = $\frac{5}{16}$

∴ Required quadratic expression, $f(x) = x^2 - Sx + P$

$= x^2 - \frac{21}{8}x + \frac{5}{16} = \frac{1}{16}[16x^2 - 42x + 5]$ or $16x^2 - 42x + 5$

Using factorization method,

$16x^2 + 42x + 5$

$= 16x^2 - 40x - 2x + 5$

$= 8x(2x - 5) - 1(2x - 5)$

$= (2x - 5)(8x - 1)$

Hence, the zeroes of $f(x)$ are $\frac{5}{2}$ and $\frac{1}{8}$.

(iii) Given that, sum of zeroes (S) $= -2\sqrt{3}$

and product of zeroes (P) $= -9$

∴ Required quadratic expression, $f(x) = x^2 - Sx + P$

$= x^2 + 2\sqrt{3}x - 9$

Using factorization method,

$= x^2 + 2\sqrt{3}x - 9$

$= x^2 + 3\sqrt{3}x - \sqrt{3} - 9$

$= x(x + 3\sqrt{3}) - \sqrt{3}(x + 3\sqrt{3})$

$= (x + 3\sqrt{3})(x - \sqrt{3})$

Hence, the zeroes of $f(x)$ are $-3\sqrt{3}$ and $\sqrt{3}$.

(iv) Given that, sum of zeroes (S) $= -\frac{3}{2\sqrt{5}}$

and product of zeroes (P) $= -\frac{1}{2}$

∴ Required quadratic expression, $f(x) = x^2 - Sx + P$

$= x^2 + \frac{3}{2\sqrt{5}} - \frac{1}{2} = \frac{1}{2\sqrt{5}}[2\sqrt{5}x^2 + 3x - \sqrt{5}]$ or $2\sqrt{5}x^2 + 3x - \sqrt{5}$

Using factorization method,

$2\sqrt{5}x^2 + 3x - \sqrt{5}$

$= 2\sqrt{5}x^2 + 5x - 2x - \sqrt{5}$

$= \sqrt{5}x(2x + \sqrt{5}) - 1(2x + \sqrt{5})$

$= (2x + \sqrt{5})(\sqrt{5} - 1)$

Hence, the zeroes of $f(x)$ are $-\frac{\sqrt{5}}{1}$ and $\frac{1}{\sqrt{5}}$.