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Class 10th - NCERT Solutions Math: Chapter 2 Polynomials



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NCERT Solutions for Class 10th Mathematics: Chapter 2 Polynomials

Class 10: Mathematics Chapter 2 solutions. Complete Class 10 Mathematics Chapter 2 Notes.

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Exercises 2.1

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1. The graphs of $y = p(x)$ are given in following figure, for some polynomials $p(x)$. Find the number of zeroes of $p(x)$, in each case.

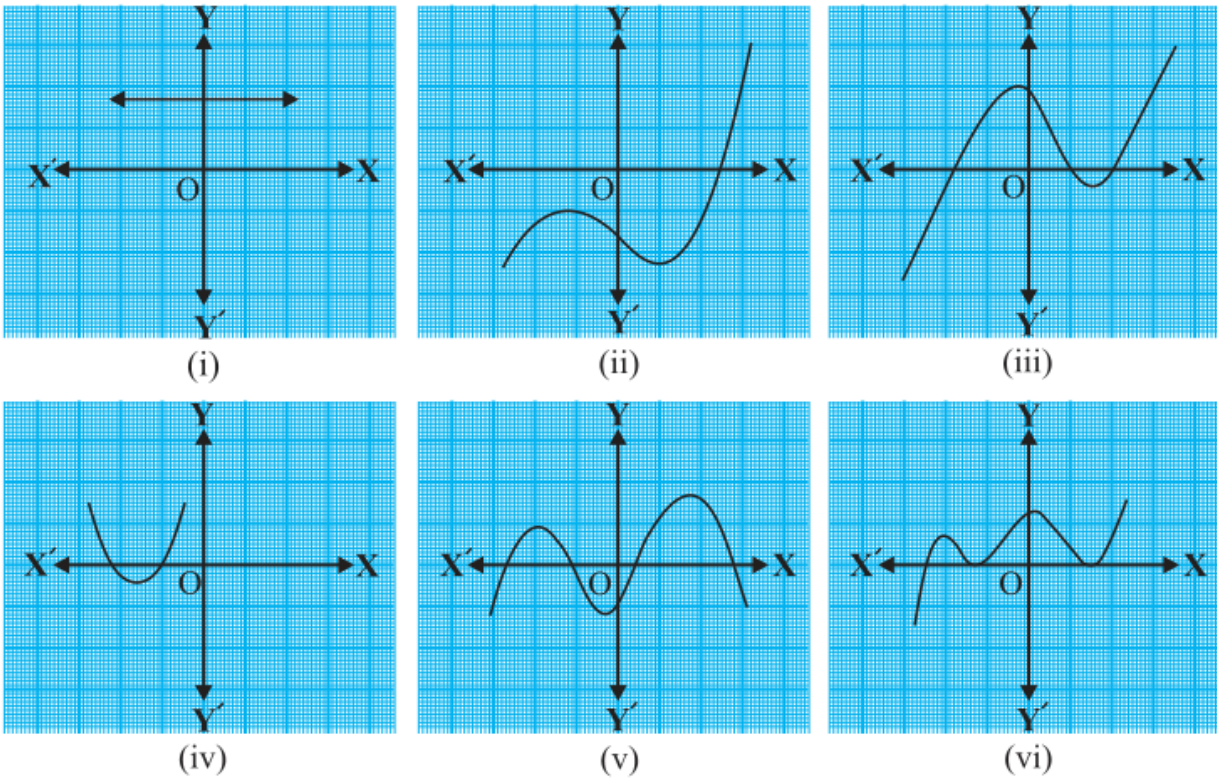


Fig. 2.10

Answer

- (i) The number of zeroes is 0 as the graph does not cut the x -axis at any point.
- (ii) The number of zeroes is 1 as the graph intersects the x -axis at only 1 point.
- (iii) The number of zeroes is 3 as the graph intersects the x -axis at 3 points.
- (iv) The number of zeroes is 2 as the graph intersects the x -axis at 2 points.
- (v) The number of zeroes is 4 as the graph intersects the x -axis at 4 points.
- (vi) The number of zeroes is 3 as the graph intersects the x -axis at 3 points.

1. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients.

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(i) $x^2 - 2x - 8$

(ii) $4s^2 - 4s + 1$

(iii) $6x^2 - 3 - 7x$

(iv) $4u^2 + 8u$

(v) $t^2 - 15$

(vi) $3x^2 - x - 4$

Answer

(i) $x^2 - 2x - 8$

$= (x - 4)(x + 2)$

The value of $x^2 - 2x - 8$ is zero when $x - 4 = 0$ or $x + 2 = 0$, i.e., when $x = 4$ or $x = -2$

Therefore, the zeroes of $x^2 - 2x - 8$ are 4 and -2.

Sum of zeroes = $4 + (-2) = 2 = -(-2)/1 = -(\text{Coefficient of } x)/\text{Coefficient of } x^2$

Product of zeroes = $4 \times (-2) = -8 = -8/1 = \text{Constant term}/\text{Coefficient of } x^2$

(ii) $4s^2 - 4s + 1$

$= (2s-1)^2$

The value of $4s^2 - 4s + 1$ is zero when $2s - 1 = 0$, i.e., $s = 1/2$

Therefore, the zeroes of $4s^2 - 4s + 1$ are $1/2$ and $1/2$.

Sum of zeroes = $1/2 + 1/2 = 1 = -(-4)/4 = -(\text{Coefficient of } s)/\text{Coefficient of } s^2$

Product of zeroes = $1/2 \times 1/2 = 1/4 = \text{Constant term}/\text{Coefficient of } s^2$.

(iii) $6x^2 - 3 - 7x$

$= 6x^2 - 7x - 3$

$= (3x + 1)(2x - 3)$

The value of $6x^2 - 3 - 7x$ is zero when $3x + 1 = 0$ or $2x - 3 = 0$, i.e., $x = -1/3$ or $x = 3/2$

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Therefore, the zeroes of $6x^2 - 3 - 7x$ are $-1/3$ and $3/2$.

Sum of zeroes = $-1/3 + 3/2 = 7/6 = -(-7)/6 = -(\text{Coefficient of } x)/\text{Coefficient of } x^2$

Product of zeroes = $-1/3 \times 3/2 = -1/2 = -3/6 = \text{Constant term}/\text{Coefficient of } x^2$.

(iv) $4u^2 + 8u$

$$= 4u^2 + 8u + 0$$

$$= 4u(u + 2)$$

The value of $4u^2 + 8u$ is zero when $4u = 0$ or $u + 2 = 0$, i.e., $u = 0$ or $u = -2$

Therefore, the zeroes of $4u^2 + 8u$ are 0 and -2.

Sum of zeroes = $0 + (-2) = -2 = -(8)/4 = -(\text{Coefficient of } u)/\text{Coefficient of } u^2$

Product of zeroes = $0 \times (-2) = 0 = 0/4 = \text{Constant term}/\text{Coefficient of } u^2$.

(v) $t^2 - 15$

$$= t^2 - 0.t - 15$$

$$= (t - \sqrt{15})(t + \sqrt{15})$$

The value of $t^2 - 15$ is zero when $t - \sqrt{15} = 0$ or $t + \sqrt{15} = 0$, i.e., when $t = \sqrt{15}$ or $t = -\sqrt{15}$

Therefore, the zeroes of $t^2 - 15$ are $\sqrt{15}$ and $-\sqrt{15}$. Sum of zeroes = $\sqrt{15} + -\sqrt{15} = 0 = -0/1 = -(\text{Coefficient of } t)/\text{Coefficient of } t^2$

Product of zeroes = $(\sqrt{15})(-\sqrt{15}) = -15 = -15/1 = \text{Constant term}/\text{Coefficient of } u^2$.

(vi) $3x^2 - x - 4$

$$= (3x - 4)(x + 1)$$

The value of $3x^2 - x - 4$ is zero when $3x - 4 = 0$ and $x + 1 = 0$, i.e., when $x = 4/3$ or $x = -1$

Therefore, the zeroes of $3x^2 - x - 4$ are $4/3$ and -1.

Sum of zeroes = $4/3 + (-1) = 1/3 = -(-1)/3 = -(\text{Coefficient of } x)/\text{Coefficient of } x^2$

Product of zeroes = $4/3 \times (-1) = -4/3 = \text{Constant term}/\text{Coefficient of } x^2$.

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2. Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively.

(i) $1/4$, -1

(ii) $\sqrt{2}$, $1/3$

(iii) 0 , $\sqrt{5}$

(iv) 1 , 1

(v) $-1/4$, $1/4$

(vi) 4 , 1

Answer

(i) $1/4$, -1

Let the polynomial be $ax^2 + bx + c$, and its zeroes be α and β

$$\alpha + \beta = 1/4 = -b/a$$

$$\alpha\beta = -1 = -4/4 = c/a$$

If $a = 4$, then $b = -1$, $c = -4$

Therefore, the quadratic polynomial is $4x^2 - x - 4$.

(ii) $\sqrt{2}$, $1/3$

Let the polynomial be $ax^2 + bx + c$, and its zeroes be α and β

$$\alpha + \beta = \sqrt{2} = 3\sqrt{2}/3 = -b/a$$

$$\alpha\beta = 1/3 = c/a$$

If $a = 3$, then $b = -3\sqrt{2}$, $c = 1$

Therefore, the quadratic polynomial is $3x^2 - 3\sqrt{2}x + 1$.

(iii) 0 , $\sqrt{5}$

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Let the polynomial be $ax^2 + bx + c$, and its zeroes be α and β

$$\alpha + \beta = 0 = 0/1 = -b/a$$

$$\alpha\beta = \sqrt{5} = \sqrt{5}/1 = c/a$$

If $a = 1$, then $b = 0$, $c = \sqrt{5}$

Therefore, the quadratic polynomial is $x^2 + \sqrt{5}$.

(iv) 1, 1

Let the polynomial be $ax^2 + bx + c$, and its zeroes be α and β

$$\alpha + \beta = 1 = 1/1 = -b/a$$

$$\alpha\beta = 1 = 1/1 = c/a$$

If $a = 1$, then $b = -1$, $c = 1$

Therefore, the quadratic polynomial is $x^2 - x + 1$.

(v) -1/4, 1/4

Let the polynomial be $ax^2 + bx + c$, and its zeroes be α and β

$$\alpha + \beta = -1/4 = -b/a$$

$$\alpha\beta = 1/4 = c/a$$

If $a = 4$, then $b = 1$, $c = 1$

Therefore, the quadratic polynomial is $4x^2 + x + 1$

(vi) 4, 1

Let the polynomial be $ax^2 + bx + c$, and its zeroes be α and β

$$\alpha + \beta = 4 = 4/1 = -b/a$$

$$\alpha\beta = 1 = 1/1 = c/a$$

If $a = 1$, then $b = -4$, $c = 1$

Therefore, the quadratic polynomial is $x^2 - 4x + 1$

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Exercise 2.3

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1. Divide the polynomial $p(x)$ by the polynomial $g(x)$ and find the quotient and remainder in each of the following:

Answer

(i) $p(x) = x^3 - 3x^2 + 5x - 3$, $g(x) = x^2 - 2$

$$\begin{array}{r} x - 3 \\ x^2 - 2 \overline{) x^3 - 3x^2 + 5x - 3} \\ \underline{-x^3 \qquad \qquad +2x} \qquad \qquad \qquad \\ -3x^2 + 7x - 3 \\ \underline{+3x^2 \qquad \qquad +6} \qquad \qquad \qquad \\ 7x - 9 \end{array}$$

Quotient = $x-3$ and remainder $7x - 9$

(ii) $p(x) = x^4 - 3x^2 + 4x + 5$, $g(x) = x^2 + 1 - x$

$$\begin{array}{r}
 x^2 + x - 3 \\
 \hline
 x^2 - x + 1 \left\{ \begin{array}{l} x^4 \quad - 3x^2 + 4x - 5 \\ -x^4 + x^3 + x^2 \\ \hline x^3 - 4x^2 + 4x + 5 \\ -x^3 + x^2 + x \\ \hline -3x^2 + 3x + 5 \\ +3x^2 + 3x + 3 \\ \hline 8 \end{array} \right.
 \end{array}$$

Quotient = $x^2 + x - 3$ and remainder 8

(iii) $p(x) = x^4 - 5x + 6$, $g(x) = 2 - x^2$

$$\begin{array}{r}
 -x^2 - 2 \\
 \hline
 -x^2 + 2 \left\{ \begin{array}{l} x^4 \quad - 5x + 6 \\ -x^4 + 2x^2 \\ \hline 2x^2 - 5x + 6 \\ -2x^2 \quad - 4 \\ \hline -5x + 10 \end{array} \right.
 \end{array}$$

Quotient = $-x^2 - 2$ and remainder $-5x + 10$

2. Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial:

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$$\begin{array}{r}
 3x^2 + 4x + 2 \\
 \hline
 x^2 + 3x + 1 \left\{ \begin{array}{l} 3x^4 + 5x^3 - 7x^2 + 2x + 2 \\ \underline{-3x^4 + 9x^3 - 3x^2} \\ -4x^3 - 10x^2 + 2x + 2 \\ \underline{+4x^3 + 12x^2 - 4x} \\ 2x^2 + 6x + 2 \\ \underline{-2x^2 + 6x + 2} \\ x \quad x \quad x \end{array} \right.
 \end{array}$$

$x^2 + 3x + 1$ exactly divides $3x^4 + 5x^3 - 7x^2 + 2x + 2$ leaving no remainder. Hence, it is factor of $3x^4 + 5x^3 - 7x^2 + 2x + 2$.

(iii) $x^3 - 3x + 1$, $x^5 - 4x^3 + x^2 + 3x + 1$

$$\begin{array}{r}
 x^2 - 1 \\
 \hline
 x^2 - 3x + 1 \left\{ \begin{array}{l} x^5 - 4x^3 + x^2 + 3x + 1 \\ \underline{-x^5 + 3x^3 - x^2} \\ -x^3 + 3x + 1 \\ \underline{+x^3 - 3x + 1} \\ 2 \end{array} \right.
 \end{array}$$

$x^3 - 3x + 1$ didn't divide exactly $x^5 - 4x^3 + x^2 + 3x + 1$ and leaves 2 as remainder. Hence, it is not a factor of $x^5 - 4x^3 + x^2 + 3x + 1$.

3. Obtain all other zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeroes are $\sqrt{5/3}$ and $-\sqrt{5/3}$.

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Answer

$$p(x) = 3x^4 + 6x^3 - 2x^2 - 10x - 5$$

Since the two zeroes are $\sqrt[3]{5/3}$ and $-\sqrt[3]{5/3}$.

$$\therefore \left(x - \sqrt[3]{\frac{5}{3}}\right)\left(x + \sqrt[3]{\frac{5}{3}}\right) = \left(x^2 - \frac{5}{3}\right) \text{ is factor of}$$

$$3x^4 + 6x^3 - 2x^2 - 10x - 5$$

Therefore, we divide the given polynomial by $x^2 - 5/3$.

$$\begin{array}{r}
 3x^2 + 6x + 3 \\
 \hline
 x^2 - 0x - 5/3 \quad \left\{ \begin{array}{l} 3x^4 + 6x^3 - 2x^2 - 10x - 5 \\ 3x^4 + 0x^3 - 5x^2 \\ \hline 6x^3 + 3x^2 - 10x - 5 \\ 6x^3 + 0x^2 - 10x \\ \hline 3x^2 + 0x - 5 \\ 3x^2 + 0x - 5 \\ \hline x \end{array} \right.
 \end{array}$$

$$3x^4 + 6x^3 - 2x^2 - 10x - 5 = \left(x^2 - \frac{5}{3}\right)(3x^2 + 6x + 3)$$

$$= 3\left(x^2 - \frac{5}{3}\right)(x^2 + 2x + 1)$$

We factorize $x^2 + 2x + 1$

$$= (x + 1)^2$$

Therefore, its zero is given by $x + 1 = 0$

$$x = -1$$

As it has the term $(x + 1)^2$, therefore, there will be 2 zeroes at $x = -1$.

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Hence, the zeroes of the given polynomial are $\sqrt{5/3}$ and $-\sqrt{5/3}$, - 1 and - 1.

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4. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial $g(x)$, the quotient and remainder were $x - 2$ and $-2x + 4$, respectively. Find $g(x)$.

Answer

Here in the given question,

$$\text{Dividend} = x^3 - 3x^2 + x + 2$$

$$\text{Quotient} = x - 2$$

$$\text{Remainder} = -2x + 4$$

$$\text{Divisor} = g(x)$$

We know that,

$$\text{Dividend} = \text{Quotient} \times \text{Divisor} + \text{Remainder}$$

$$\Rightarrow x^3 - 3x^2 + x + 2 = (x - 2) \times g(x) + (-2x + 4) \Rightarrow x^3 - 3x^2 + x + 2 - (-2x + 4) = (x - 2) \times g(x)$$

$$\Rightarrow x^3 - 3x^2 + 3x - 2 = (x - 2) \times g(x)$$

$$\Rightarrow g(x) = (x^3 - 3x^2 + 3x - 2)/(x - 2)$$

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$$\begin{array}{r}
 x^2 - x + 1 \\
 \hline
 x - 2 \overline{) \begin{array}{l} x^3 - 3x^2 + 3x - 1 \\ x^3 - 2x^2 \\ \hline -x^2 + 3x - 2 \\ -x^2 + 2x \\ \hline + \\ x - 2 \\ x - 2 \\ \hline - \\ \hline 0 \end{array} }
 \end{array}$$

$$\therefore g(x) = (x^2 - x + 1)$$

5. Give examples of polynomial $p(x)$, $g(x)$, $q(x)$ and $r(x)$, which satisfy the division algorithm and

(i) $\deg p(x) = \deg q(x)$

(ii) $\deg q(x) = \deg r(x)$

(iii) $\deg r(x) = 0$

Answer

(i) Let us assume the division of $6x^2 + 2x + 2$ by 2

Here, $p(x) = 6x^2 + 2x + 2$

$g(x) = 2$

$q(x) = 3x^2 + x + 1$

$r(x) = 0$

Degree of $p(x)$ and $q(x)$ is same i.e. 2.

Checking for division algorithm,

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$$p(x) = g(x) \times q(x) + r(x)$$

$$\text{Or, } 6x^2 + 2x + 2 = 2x(3x^2 + x + 1)$$

Hence, division algorithm is satisfied.

(ii) Let us assume the division of $x^3 + x$ by x^2 ,

$$\text{Here, } p(x) = x^3 + x$$

$$g(x) = x^2$$

$$q(x) = x \text{ and } r(x) = x$$

Clearly, the degree of $q(x)$ and $r(x)$ is the same i.e., 1.

Checking for division algorithm,

$$p(x) = g(x) \times q(x) + r(x)$$

$$x^3 + x = (x^2) \times x + x$$

$$x^3 + x = x^3 + x$$

Thus, the division algorithm is satisfied.

(iii) Let us assume the division of $x^3 + 1$ by x^2 .

$$\text{Here, } p(x) = x^3 + 1$$

$$g(x) = x^2$$

$$q(x) = x \text{ and } r(x) = 1$$

Clearly, the degree of $r(x)$ is 0.

Checking for division algorithm,

$$p(x) = g(x) \times q(x) + r(x)$$

$$x^3 + 1 = (x^2) \times x + 1$$

$$x^3 + 1 = x^3 + 1$$

Thus, the division algorithm is satisfied.

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Exercise 2.4 (Optional)

1. Verify that the numbers given alongside of the cubic polynomials below are their zeroes. Also verify the relationship between the zeroes and the coefficients in each case:

(i) $2x^3 + x^2 - 5x + 2$; $1/2$, 1 , -2

(ii) $x^3 - 4x^2 + 5x - 2$; 2 , 1 , 1

Answer

(i) $p(x) = 2x^3 + x^2 - 5x + 2$

Now for zeroes, putting the given value in x .

$$p(1/2) = 2(1/2)^3 + (1/2)^2 - 5(1/2) + 2$$

$$= (2 \times 1/8) + 1/4 - 5/2 + 2$$

$$= 1/4 + 1/4 - 5/2 + 2$$

$$= 1/2 - 5/2 + 2 = 0$$

$$p(1) = 2(1)^3 + (1)^2 - 5(1) + 2$$

$$= (2 \times 1) + 1 - 5 + 2$$

$$= 2 + 1 - 5 + 2 = 0$$

$$p(-2) = 2(-2)^3 + (-2)^2 - 5(-2) + 2$$

$$= (2 \times -8) + 4 + 10 + 2$$

$$= -16 + 16 = 0$$

Thus, $1/2$, 1 and -2 are the zeroes of the given polynomial.

Comparing the given polynomial with $ax^3 + bx^2 + cx + d$, we get $a=2$, $b=1$, $c=-5$, $d=2$

Also, $\alpha=1/2$, $\beta=1$ and $\gamma=-2$

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Now,

$$-b/a = \alpha + \beta + \gamma$$

$$\Rightarrow 1/2 = 1/2 + 1 - 2$$

$$\Rightarrow 1/2 = 1/2$$

$$c/a =$$

$$\alpha\beta + \beta\gamma + \gamma\alpha$$

$$\Rightarrow -5/2 = (1/2 \times 1) + (1 \times -2) + (-2 \times 1/2)$$

$$\Rightarrow -5/2 = 1/2 - 2 - 1$$

$$\Rightarrow -5/2 = -5/2$$

$$-d/a = \alpha\beta\gamma$$

$$\Rightarrow -2/2 = (1/2 \times 1 \times -2)$$

$$\Rightarrow -1 = 1$$

Thus, the relationship between zeroes and the coefficients are verified.

$$(ii) p(x) = x^3 - 4x^2 + 5x - 2$$

Now for zeroes, putting the given value in x.

$$p(2) = 2^3 - 4(2)^2 + 5(2) - 2$$

$$= 8 - 16 + 10 - 2$$

$$= 0$$

$$p(1) = 1^3 - 4(1)^2 + 5(1) - 2$$

$$= 1 - 4 + 5 - 2$$

$$= 0$$

$$p(1) = 1^3 - 4(1)^2 + 5(1) - 2$$

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$$= 1 - 4 + 5 - 2$$

$$= 0$$

Thus, 2, 1 and 1 are the zeroes of the given polynomial.

Comparing the given polynomial with $ax^3 + bx^2 + cx + d$, we get $a=1$, $b=-4$, $c=5$, $d=-2$

Also, $\alpha=2$, $\beta=1$ and $\gamma=1$

Now,

$$-b/a = \alpha + \beta + \gamma$$

$$\Rightarrow 4/1 = 2 + 1 + 1$$

$$\Rightarrow 4 = 4$$

$$c/a =$$

$$\alpha\beta + \beta\gamma + \gamma\alpha$$

$$\Rightarrow 5/1 = (2 \times 1) + (1 \times 1) + (1 \times 2)$$

$$\Rightarrow 5 = 2 + 1 + 2$$

$$\Rightarrow 5 = 5$$

$$-d/a = \alpha\beta\gamma$$

$$\Rightarrow 2/1 = (2 \times 1 \times 1)$$

$$\Rightarrow 2 = 2$$

Thus, the relationship between zeroes and the coefficients are verified.

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2. Find a cubic polynomial with the sum, sum of the product of its zeroes taken two at a time, and the product of its zeroes as 2, -7, -14 respectively.

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Answer

Let the polynomial be $ax^3 + bx^2 + cx + d$ and the zeroes be α , β and γ

$$\text{Then, } \alpha + \beta + \gamma = -(-2)/1 = 2 = -b/a$$

$$\alpha\beta + \beta\gamma + \gamma\alpha = -7 = -7/1 = c/a$$

$$\alpha\beta\gamma = -14 = -14/1 = -d/a$$

$$\therefore a = 1, b = -2, c = -7 \text{ and } d = 14$$

So, one cubic polynomial which satisfy the given conditions will be $x^3 - 2x^2 - 7x + 14$

3. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a-b$, a , $a+b$, find a and b .

Answer

Since, $(a - b)$, a , $(a + b)$ are the zeroes of the polynomial $x^3 - 3x^2 + x + 1$.

$$\text{Therefore, sum of the zeroes} = (a - b) + a + (a + b) = -(-3)/1 = 3$$

$$\Rightarrow 3a = 3 \Rightarrow a = 1$$

$$\therefore \text{Sum of the products of its zeroes taken two at a time} = a(a - b) + a(a + b) + (a + b)(a - b) = 1/1 = 1$$

$$a^2 - ab + a^2 + ab + a^2 - b^2 = 1$$

$$\Rightarrow 3a^2 - b^2 = 1$$

Putting the value of a ,

$$\Rightarrow 3(1)^2 - b^2 = 1$$

$$\Rightarrow 3 - b^2 = 1$$

$$\Rightarrow b^2 = 2$$

$$\Rightarrow b = \pm\sqrt{2}$$

Hence, $a = 1$ and $b = \pm\sqrt{2}$

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4. If two zeroes of the polynomial $x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 \pm \sqrt{3}$, find other zeroes.

Answer

$2 + \sqrt{3}$ and $2 - \sqrt{3}$ are two zeroes of the polynomial $p(x) = x^4 - 6x^3 - 26x^2 + 138x - 35$.

Let $x = 2 \pm \sqrt{3}$

So, $x - 2 = \pm \sqrt{3}$

On squaring, we get $x^2 - 4x + 4 = 3$,

$$\Rightarrow x^2 - 4x + 1 = 0$$

Now, dividing $p(x)$ by $x^2 - 4x + 1$

$$\begin{array}{r}
 x^2 - 2x - 35 \\
 x^2 - 4x + 1 \overline{) x^4 - 6x^3 - 26x^2 + 138x - 35} \\
 \underline{x^4 - 4x^3 + x^2} \\
 -2x^3 - 27x^2 + 138x - 35 \\
 \underline{-2x^3 + 8x^2 - 2x} \\
 -35x^2 + 140x - 35 \\
 \underline{-35x^2 + 140x - 35} \\
 0
 \end{array}$$

$$\therefore p(x) = x^4 - 6x^3 - 26x^2 + 138x - 35$$

$$= (x^2 - 4x + 1)(x^2 - 2x - 35)$$

$$= (x^2 - 4x + 1)(x^2 - 7x + 5x - 35)$$

$$= (x^2 - 4x + 1)[x(x - 7) + 5(x - 7)]$$

$$= (x^2 - 4x + 1)(x + 5)(x - 7)$$

$\therefore (x + 5)$ and $(x - 7)$ are other factors of $p(x)$.

$\therefore -5$ and 7 are other zeroes of the given polynomial.

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5. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be $x + a$, find k and a .

Answer

On dividing $x^4 - 6x^3 + 16x^2 - 25x + 10$ by $x^2 - 2x + k$

$$\begin{array}{r}
 x^2 - 4x + (8 - k) \\
 x^2 - 2x + k \overline{) x^4 - 6x^3 + 16x^2 - 25x + 10} \\
 \underline{x^4 - 2x^3 + kx^2} \\
 -4x^3 + (16 - k)x^2 - 25x + 10 \\
 \underline{-4x^3 + 8x^2 + 4kx} \\
 (8 - k)x^2 + (4k - 25)x + 10 \\
 \underline{(8 - k)x^2 - 2(8 - k)x + (8 - k)k} \\
 (2k - 9)x - (8 - k)k + 10
 \end{array}$$

\therefore Remainder = $(2k - 9)x - (8 - k)k + 10$

But the remainder is given as $x + a$.

On comparing their coefficients,

$$2k - 9 = 1$$

$$\Rightarrow k = 10$$

$$\Rightarrow k = 5 \text{ and,}$$

$$-(8 - k)k + 10 = a$$

$$\Rightarrow a = -(8 - 5)5 + 10 = -15 + 10 = -5$$

Hence, $k = 5$ and $a = -5$

NCERT 10th Mathematics Chapter 2, class 10 Mathematics Chapter 2 solutions

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