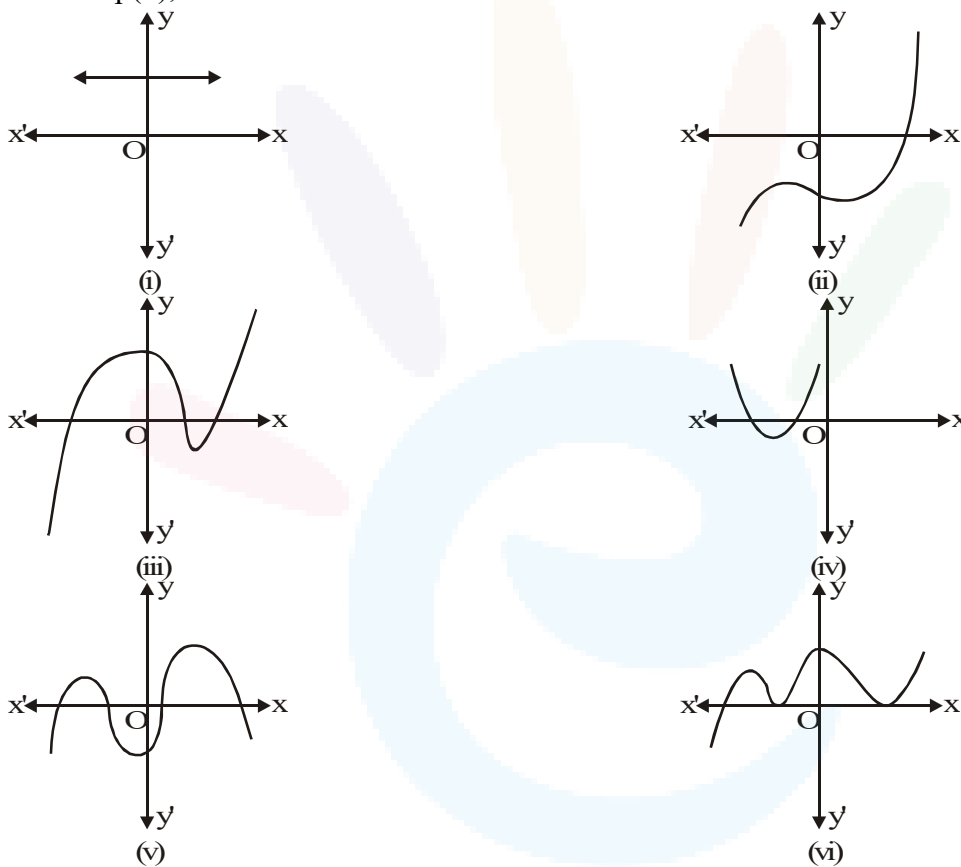


CLASS X: MATHS
Chapter 2: Polynomials

Questions and Solutions | Exercise 2.1 - NCERT Books

Q1. The graph of $y = p(x)$ are given in fig below, for some polynomials $p(x)$. Find the number of zeros of $p(x)$, in each case.



Sol. (i) Graph of $y = p(x)$ does not intersect the x -axis. Hence, polynomial $p(x)$ has no zero.

(ii) Graph of $y = p(x)$ intersects the x -axis at one and only one point.
Hence, polynomial $p(x)$ has **one and only one** real zero.

- (iii) Graph of $y = p(x)$ intersects the x-axis at 3 points. Hence, polynomial $p(x)$ has 3 zeros.
- (iv) Graph of $y = p(x)$ intersects the x-axis at 2 points. Hence, polynomial $p(x)$ has 2 zeros.
- (v) Graph of $y = p(x)$ intersects the x-axis at 4 points. Hence, polynomial $p(x)$ has 4 zeros.
- (vi) Graph of $y = p(x)$ intersects the x-axis at 1 points and touch x-axis at 2 points. Hence, $p(x)$ has 3 zeros.

Questions and Solutions | Exercise 2.2 - NCERT Books

Q1. Find the zeros of the following quadratic polynomials and verify the relationship between the zeros and the coefficients.

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

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

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

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

(v) $t^2 - 15$

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

Sol. (i) $x^2 - 2x - 8 = x^2 - 4x + 2x - 8$
 $= x(x - 4) + 2(x - 4) = (x + 2)(x - 4)$
Zeroes are -2 and 4 .

Sum of the zeros

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

Product of the zeros

$$= (-2)(4) = -8 = \frac{(-8)}{1} = \frac{(\text{Constant term})}{(\text{Coefficient of } x^2)}$$

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

The two zeros are $\frac{1}{2}, \frac{1}{2}$

Sum of the two zeros

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

Product of two zeros

$$= \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4} = \frac{(\text{Constant term})}{(\text{Coefficient of } x^2)}$$

(iii) $6x^2 - 7x - 3$
 $= 6x^2 - 9x + 2x - 3$
 $= 3x(2x - 3) + 1(2x - 3)$
 $= (2x - 3)(3x + 1)$

zeros are $\frac{3}{2}, \frac{-1}{3}$

Sum of zeros = $\frac{3}{2} + \left(\frac{-1}{3}\right)$

$$= \frac{9 - 2}{6} = \frac{7}{6} = \frac{-(-7)}{6} = \frac{-(\text{coefficient of } x)}{(\text{coefficient of } x^2)}$$

Product of zeros

$$= \frac{3}{2} \times \left(\frac{-1}{3}\right) = \frac{-1}{2} = \frac{-(3)}{6}$$

$$= \frac{(\text{constant term})}{(\text{coefficient of } x^2)}$$

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

zeros are 0, -2

Sum of zeros

$$= 0 + (-2) = -2 = \frac{-(8)}{4}$$

$$= - \frac{(\text{coefficient of } u)}{(\text{coefficient of } u^2)}$$

Product of zeros

$$= 0 \times (-2) = 0 = \frac{0}{4}$$

$$= \frac{\text{constant term}}{\text{coefficient of } u^2}$$

(v) $t^2 - 15 = (t - \sqrt{15})(t + \sqrt{15})$

zeros are $\sqrt{15}$, $-\sqrt{15}$

sum of zeros

$$= \sqrt{15} + (-\sqrt{15}) = 0 = \frac{0}{1}$$

$$= - \frac{(\text{coefficient of } t)}{(\text{coefficient of } t^2)}$$

Product of zeros

$$= (\sqrt{15})(-\sqrt{15}) = -15 = \frac{-15}{1}$$

$$= \frac{\text{constant term}}{\text{coefficient of } t^2}$$

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

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

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

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

zeros are $\frac{4}{3}$, -1

Sum of zeros

$$= \frac{4}{3} - 1 = \frac{1}{3} = -\frac{(-1)}{3}$$

$$= -\frac{(\text{coefficient of } x)}{\text{coefficient of } x^2}$$

$$\text{Product of zeros} = \frac{4}{3} \times (-1) = -\frac{4}{3}$$

$$= \frac{(\text{constant term})}{\text{coefficient of } x^2}$$

Q2. Find a quadratic polynomial each with the given numbers as the sum and product of its zeros respectively.

(i) $\frac{1}{4}, -1$

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

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

(iv) $1, 1$

(v) $-\frac{1}{4}, \frac{1}{4}$

(vi) $4, 1$

Sol. (i) Required polynomial =
 $x^2 - (\text{sum of zeros})x + \text{product of zeros}$

$$= x^2 - \frac{1}{4}x - 1$$

$$= \frac{1}{4} (4x^2 - x - 1).$$

(ii) Required polynomial =
 $x^2 - (\text{sum of zeros})x + \text{product of zeros}$

$$= x^2 - \sqrt{2}x + \frac{1}{3}$$

$$= \frac{1}{3} (3x^2 - 3\sqrt{2}x + 1).$$

(iii) Required polynomial =
 $x^2 - (\text{sum of zeros})x + \text{product of zeros}$

$$= x^2 - 0x + \sqrt{5}$$

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

(iv) Required polynomial =
 $x^2 - (\text{sum of zeros})x + \text{product of zeros}$
 $= x^2 - 1x + 1$
 $= x^2 - x + 1.$

(v) Required polynomial =
 $x^2 - (\text{sum of zeros})x + \text{product of zeros}$
 $= x^2 - \left(-\frac{1}{4}\right)x + \frac{1}{4}$
 $= x^2 + \frac{1}{4}x + \frac{1}{4}$
 $= \frac{1}{4}(4x^2 + x + 1).$

(vi) Required polynomial =
 $x^2 - (\text{sum of zeros})x + \text{product of zeros} = x^2 - 4x + 1.$