NCERT Solutions for Class 9 Maths Chapter 2 Polynomials Ex 2.2

Question 1.

Find the value of the polynomial $5x – 4x^2 + 3$ at

(i) $x = 0$

(ii) $x = –1$

(iii) $x = 2$

Solution:

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

$p(0) = 5(0) + 4(0)^2 + 3 = 3$

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

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

$= 5 – 4(1) + 3 = -6$

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

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

$= 10 – 16 + 3 = -3$

Question 2.

Find p(0), p(1) and p(2) for each of the following polynomials:

(i) $p(y) = y^2 - y + 1$

(ii) $p(t) = 2 + t + 2t^2 - t^3$

(iii) $p(x) = x^3$

(iv) $p(x) = (x-1)(x+1)$

Solution:

(i) $p(y) = y^2 – y + 1$

$p (0) = (0)^2 – (0) + 1 = 1$

$p (1) = (1)^2 – (1) + 1 = 1$

$p (2) = (2)^2 – (2) + 1 = 3$

(ii) $p(t) = 2 + t + 2t^2 – t^3$

$p (0) = 2 + 0 + 2 (0)^2 – (0)^3 = 2$

$p (1) = 2 + (1) + 2 (1)^2 – (1)^3$

$= 2 + 1 + 2 – 1 = 4$

$p (2) = 2 + 2 + 2 (2)^2 – (2)^3$

$= 2 + 2 + 8 – 8 = 4$

(iii) $p(x) = x^3$

$p (0) = (0)^3 = 0$

$p (1) = (1)^3 = 1$

$p (2) = (2)^3 = 8$

(iv) $p(x) = (x – 1) (x + 1)$

$p (0) = (0 – 1) (0 + 1) = (-1) (1) = -1$

$p (1) = (1 – 1) (1 + 1) = 0 (2) = 0$

$p (2) = (2 – 1) (2 + 1) = 1 (3) = 3$

Question 3.

Verify whether the following are zeroes of the polynomial, indicated against them.

(i) $p(x) = 3x + 1, x = -\frac{1}{3}$

(ii) $p(x) = 5x - \pi, x = \frac{4}{5}$

(iii) $p(x) = x^2 - 1, x = 1, -1$

(iv) $p(x) = (x+1)(x-2), x = -1, 2$

(v) $p(x) = x^2, x = 0$

(vi) $p(x) = lx + m, = -\frac{m}{l}$

(vii) $p(x) = 3x^2 - 1, x = -\frac{1}{\sqrt{3}}, \frac{2}{\sqrt{3}}$

(viii) $p(x) = 2x + 1, x = \frac{1}{2}$

Solution:

(i) If x = $\frac{-1}{3}$ is a zero of polynomial p(x) = 3x + 1 then p ($\frac{-1}{3}$) should be 0

At, $p\left(\frac{-1}{3}\right) = 3\left(\frac{-1}{3}\right) + 1$

= -1 + 1 = 0

Therefore, x = –1/3 is a zero of polynomial p(x) = 3x + 1

(ii) If x = $\frac{4}{5}$ is a zero of polynomial p(x) = 5x - π then p ($\frac{4}{5}$) should be 0

$p\left(\frac{4}{5}\right) = 5\left(\frac{4}{5}\right) - \pi = 4 - \pi$

Therefore, $x = 4/5$ is not a zero of polynomial $p(x) = 5x - \pi$

(iii) If $x = 1$ and $x = -1$ are zeros of polynomial $p(x) = x^2 - 1$ then p (1) and p (-1) should be 0

At, $p(1) = (1)^2 - 1 = 0$ and,

At, $p(-1) = (-1)^2 - 1 = 0$

Hence, $x = 1$ and -1 are zeros of polynomial $p(x) = x^2 - 1$

(iv) If $x = -1$ and $x = 2$ are zeros of polynomial $p(x) = (x + 1)(x - 2)$ then p (-1) and p (2) should be 0

At, $p(-1) = (-1 + 1)(-1 - 2) = 0(-3) = 0$ and,

At, $p(2) = (2 + 1)(2 - 2) = 3(0) = 0$

Hence, $x = -1$ and $x = 2$ are zeros of polynomial $p(x) = (x + 1)(x - 2)$

(v) If $x = 0$ is a zero of polynomial $p(x) = x^2$

Then, p (0) should be zero

Here, $p(0) = (0)^2 = 0$

Hence, $x = 0$ is the zero of the polynomial $p(x) = x^2$

(vi) If $x = \frac{-m}{l}$ is a zero of the polynomial $(x) = lx + m$ then $p\left(\frac{-m}{l}\right)$ should be 0

At, $p\left(\frac{-m}{l}\right) = l\left(\frac{-m}{l}\right) + m = -m + m = 0$

Therefore, $x = \frac{-m}{l}$ is the zero of the polynomial $p(x) = lx + m$

(vii) If x = $\frac{-1}{\sqrt{3}}$ and x = $\frac{2}{\sqrt{3}}$ are zeros of the polynomial p (x) = $3x^2 - 1$, then

p ($\frac{-1}{\sqrt{3}}$) and p ($\frac{2}{\sqrt{3}}$) should be 0

At, p ($\frac{-1}{\sqrt{3}}$) = 3 $(\frac{-1}{\sqrt{3}})^2 - 1$

= 3 ($\frac{1}{3}$) – 1

= 1 – 1 = 0 and,

At, p ($\frac{2}{\sqrt{3}}$) = 3 $(\frac{2}{\sqrt{3}})^2 - 1$

= 3 ($\frac{4}{3}$) – 1

= 4 – 1 = 3

Therefore, x = $\frac{-1}{\sqrt{3}}$ is a zero of the polynomial p (x) = $3x^2 + 1$

But, x = $\frac{2}{\sqrt{3}}$ is not a zero of the polynomial

(viii) If x = $\frac{1}{2}$ is a zero of polynomial p (x) = 2x + 1 then p (1/2) should be zero

At, p ($\frac{1}{2}$) = 2 ($\frac{1}{2}$) + 1

= 1 + 1 = 2

Therefore, x = $\frac{1}{2}$ is not a zero of given polynomial p (x) = 2x + 1

Question 4.

Find the zero of the polynomial in each of the following cases:

(i) $p(x) = x + 5$

(ii) $p(x) = x - 5$

(iii) $p(x) = 2x + 5$

(iv) $p(x) = 3x - 2$

(v) $p(x) = 3x$

(vi) $p(x) = ax, a \neq 0$

(vii) $p(x) = cx + d, c \neq 0, c, d$ are real numbers.

Solution:

(i) p (x) = x + 5

p (x) = 0

x + 5 = 0

x = -5

Therefore, x = -5 is a zero of the polynomial p(x) = x + 5

(ii) p (x) = x – 5

p (x) = 0

x – 5 = 0

x = 5

Therefore, x = 5 is a zero of the polynomial p(x) = x - 5

(iii) p (x) = 2x + 5

P (x) = 0

2x + 5 = 0

2x = -5

x = $\frac{-5}{2}$

Therefore, x = $\frac{-5}{2}$ is a zero of the polynomial p(x) = 2x + 5

(iv) p (x) = 3x – 2

p (x) = 0

3x – 2 = 0

x = $\frac{2}{3}$

Therefore, x = $\frac{2}{3}$ is a zero of the polynomial p(x) = 3x - 2

(v) p (x) = 3x

p (x) = 0

3x = 0

x = 0

Therefore, x = 0 is a zero of the polynomial p(x) = 3x

(vi) p (x) = ax

p (x) = 0

ax = 0

x = 0

Therefore, x = 0 is a zero of the polynomial p(x) = ax

(vii) p (x) = cx + d

p (x) = 0

cx + d = 0

x = $\frac{-d}{c}$

Therefore, x = $\frac{-d}{c}$ is a zero of polynomial p (x) = cx + d