SpeedLabs

MATHS

CBSE 9th

TEEVRA EDUTECH PVT. LTD.

Polynomials

Exercise-2.2

1. Find the value of the polynomial $5x - 4x^2 + 3$ at

(i) $x = 0$ **(ii)** $x = -1$ **(iii)** $x = 2$

Ans - **(i)** Let f (x) $5x - 4x^2 + 3$

We need to substitute 0 in the polynomial (x) $5x - 4x^2 + 3$ to get $f(0) = 5(0) - 4(0)^2 + 3$

$= 0\text{-}0 + 3$

$=3$

Therefore, we conclude that at, the value of the polynomial $5x - 4x^2 + 3$ is 3.

(ii) Let f (x) $5x - 4x^2 + 3$

We need to substitute -1 in the polynomial f(x) $5x - 4x^2 + 3$ to get $f(-1) = 5(-1) - 4(-1)^2 + 3$

$= -5 - 4 + 3$

$= -6$

Therefore, we conclude that at $x = -1$, the value of the polynomial $5x - 4x^2 + 3$ is -6

(iii) Let f (x) $5x - 4x^2 + 3$

We need to substitute -1 in the polynomial f(x) $5x - 4x^2 + 3$ to get $f(2) = 5(2) - 4(2)^2 + 3$

$= -10 - 16 + 3$

$= -3$

Therefore, we conclude that at $x = 3$, the value of the polynomial $5x - 4x^2 + 3$ is -3.

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

(i) $p(y) = y^2 = y^2 - y + 1$ **(ii)** $p(t) = 2 + t + 2t^2 - t^3$

(iii) $p(x) = x^3$ **(iv)** $p(x) = (x - 1)(x + 1)$

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

At p (0) :

$P(0) = (0)^2 - 0 + 1 = 1$

At p (1) :

$p(1) = (1)^2 - 1 + 1 = 1 - 0 = 1$

At p(2)

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

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

$At^{p(0)}$:

$p(0) = 2 + (0) + 2(0)^2 - (0)^3 = 2$

At $p(1)$:

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

At $p(0)$:

$p(2) = 2 + (2) + 2(2)^2 - (2)^3 = 4 + 8 - 8 = 4$

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

At $p(0)$:

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

At $p(1)$:

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

At $p(2)$:

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

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

At $p(0)$:

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

At $p(1)$:

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

At $p(2)$:

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

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

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

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

We need to check whether $p(x) = 3x + 1,\ x = -\frac{1}{3}$ is equal to zero or not.

$$p\left(-\frac{1}{3}\right) = 3x + 1 = 3\left(-\frac{1}{3}\right) + 1 = -1 + 1 = 0$$

Therefore, we can conclude that $= -\frac{1}{3}$ is a zero of the polynomial $p(x) = 3x + 1$

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

We need to check whether $p(x) = 5x - \pi,\ x = \frac{4}{5}$ is equal to zero or not.

Therefore, is not a zero of the polynomial .

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

We need to check whether $p(x) = x^2 - 1$, at $x = -1,1$ is equal to zero or not.

At x = -1

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

At $x = 1$

$(1) = (1)^2 - 1 = 1 - 1 = 0$

Therefore, $x = -1,1$ are the zeros of the polynomial $p(x) = x^2 - 1$.

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

We need to check whether $p(x) = (x + 1)(x - 2)$, at $x = -1,2$ is equal to zero or not.

At x = -1

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

At $x = 2$

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

$p(x) = (x + 1)(x - 2)$.

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

We need to check whether $p(x) = x^2$, at $x = 0$ is equal to zero or not.

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

Therefore, we can conclude that x=0 is a zero of the polynomial $p(x) = x^2$

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

We need to check whether p(x)=lx + m, at $x = -\frac{m}{l}$ is equal to zero or not.

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

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

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

We need to check whether $(x) = 3x^2 - 1$, at $x = -\frac{1}{\sqrt{3}}, \frac{2}{\sqrt{3}}$ is equal to zero or not.

At $x = \frac{1}{\sqrt{3}}$

$p\left(\frac{1}{\sqrt{3}}\right) = 3\ \left(\frac{3}{\sqrt{3}}\right)^2 - 1 = 3\left(\frac{1}{3}\right) - 1 = 1 - 1 = 0$

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

$p\left(\frac{2}{\sqrt{3}}\right) = 3\ \left(\frac{2}{\sqrt{3}}\right)^2 - 1 = 3\left(\frac{4}{3}\right) - 1 = 4 - 1 = 3$

Therefore, we can conclude that $x = \frac{-1}{\sqrt{3}}$is a zero of the polynomial $p(x) = 3x^2 - 1$ but $x = \frac{-1}{\sqrt{3}}$ is not a zero of the polynomial $p(x) = 3x^2 - 1$

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

We need to check whether $p(x) = 2x + 1$, at $x = -\frac{1}{2}$ is equal to zero or not.

$p\left(-\frac{1}{2}\right) = 2\left(-\frac{1}{2}\right) + 1 = -1 + 1 = 0$

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

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)** $p(x) = 2x - 2$

(v) $p(x) = 3x$ **(vi)** $p(x) = ax, a \neq 0$ **(vii)** $p(x) = cx + d, c \neq 0$,c,d are real number.

Ans - Zero of a polynomial is that value of the variable at which the value of the polynomial is obtained as 0.

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

$P(x) = 0$

$x + 5 = 0$

$x = -5$

Therefore, for $x = -5$, the value of the polynomial is 0 and hence, $x = -5$ is a zero of the given polynomial.

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

$p(x) = 0$

$x - 5 = 0$

$x = 5$

Therefore, for $x = 5$, the value of the polynomial is0 and hence, $x = 5$ is a zero of the given polynomial.

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

$p(x) = 0$

$2x + 5 = 0$

$2x = -5$

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

Therefore, for $x = -\frac{5}{2}$, the value of the polynomial is 0 and hence, $x = -\frac{5}{2}$ is a zero of the given polynomial.

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

$p(x) = 0$

$3x - 2 = 0$

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

Therefore, for $x = \frac{2}{3}$, the value of the polynomial is 0 and hence, $x = \frac{2}{3}$ is a zero of the given polynomial.

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

$p(x) = 0$

$3x = 0$

$x = 0$

Therefore, for $x = 0$, the value of the polynomial is 0 and hence, $x = 0$ is a zero of the given polynomial.

(vi) $p(x) = ax$

$p(x) = 0$

$ax = 0$

$x = 0$

Therefore, for $x = 0$, the value of the polynomial is 0 and hence, $x = 0$ is a zero of the given polynomial.

(vii) $p(x) = cx + d$

$p(x) = 0$

$cx + d = 0$

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

Therefore, for $x = \frac{-d}{c}$, the value of the polynomial is 0 and hence $x = \frac{-d}{c}$, is a zero of the given polynomial.