CHAPTER2 POLYNOMIALS

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1. Find the value of the polynomial (x)=5x–4x²+3.

(i) x = 0

(ii) x = – 1

(iii) x = 2

Solution:

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

(i) When x = 0

f(0) = $5(0)-4(0)^2+3$

= 3

(ii) When x = -1

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

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

$= -5-4+3$

$= -6$

(iii) When x = 2

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

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

$= 10-16+3$

$= -3$

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

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

Solution:

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

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

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

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

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

Solution:

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

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

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

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

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

Solution:

$p(x) = x^3$

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

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

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

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

Solution:

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

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

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

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

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

(i) $p(x)=3x+1$, $x = -1/3$

Solution:

For, $x = -1/3$, $p(x) = 3x+1$

∴ $p(-1/3) = 3(-1/3)+1 = -1+1 = 0$

∴ $-1/3$ is a zero of $p(x)$.

(ii) $p(x) = 5x-\pi$, $x = 4/5$

Solution:

For, $x = 4/5$, $p(x) = 5x-\pi$

∴ $p(4/5) = 5(4/5)- \pi = 4-\pi$

∴ $4/5$ is not a zero of $p(x)$.

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

Solution:

For, $x = 1, -1$;

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

∴ $p(1)=1^2-1=1-1 = 0$

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

∴ $1, -1$ are zeros of $p(x)$.

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

Solution:

For, $x = -1,2$;

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

$\therefore p(-1) = (-1+1)(-1-2)$

$= (0)(-3) = 0$

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

$\therefore -1, 2$ are zeros of $p(x)$.

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

Solution:

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

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

$\therefore 0$ is a zero of $p(x)$.

(vi) $p(x) = lx+m$, $x = -m/l$

Solution:

For, $x = -m/l$; $p(x) = lx+m$

$\therefore p(-m/l)= l(-m/l)+m = -m+m = 0$

$\therefore -m/l$ is a zero of $p(x)$.

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

Solution:

For, $x = -1/\sqrt{3}$, $2/\sqrt{3}$; $p(x) = 3x^2-1$

∴ $p(-1/\sqrt{3}) = 3(-1/\sqrt{3})^2-1 = 3(1/3)-1 = 1-1 = 0$

∴ $p(2/\sqrt{3}) = 3(2/\sqrt{3})^2-1 = 3(4/3)-1 = 4-1 = 3 \neq 0$

∴ $-1/\sqrt{3}$ is a zero of p(x), but $2/\sqrt{3}$ is not a zero of p(x).

(viii) p(x) =2x+1, x = 1/2

Solution:

For, x = 1/2 p(x) = 2x+1

∴ p(1/2) = 2(1/2)+1 = 1+1 = 2≠0

∴ 1/2 is not a zero of p(x).

4. Find the zero of the polynomials in each of the following cases:

(i) p(x) = x+5

Solution:

p(x) = x+5

⇒ x+5 = 0

⇒ x = -5

∴ -5 is a zero polynomial of the polynomial p(x).

(ii) p(x) = x–5

Solution:

p(x) = x-5

⇒ x-5 = 0

⇒ x = 5

∴ 5 is a zero polynomial of the polynomial p(x).

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

Solution:

p(x) = 2x+5

⇒ 2x+5 = 0

⇒ 2x = -5

⇒ x = -5/2

∴x = -5/2 is a zero polynomial of the polynomial p(x).

(iv) p(x) = 3x–2

Solution:

p(x) = 3x–2

⇒ 3x-2 = 0

⇒ 3x = 2

⇒x = 2/3

∴ x = 2/3 is a zero polynomial of the polynomial p(x).

(v) p(x) = 3x

Solution:

$p(x) = 3x$

$\Rightarrow 3x = 0$

$\Rightarrow x = 0$

$\therefore$ 0 is a zero polynomial of the polynomial p(x).

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

Solution:

$p(x) = ax$

$\Rightarrow ax = 0$

$\Rightarrow x = 0$

$\therefore x = 0$ is a zero polynomial of the polynomial p(x).

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

Solution:

$p(x) = cx + d$

$\Rightarrow cx+d = 0$

$\Rightarrow x = -d/c$

$\therefore x = -d/c$ is a zero polynomial of the polynomial p(x).