Exercise 2.2

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

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

Solution:

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

$\therefore p(-\frac{1}{3})=3(-\frac{1}{3})+1=-1+1=0$

$\therefore -\frac{1}{3}$ is a zero of $p(x)$.

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

Solution:

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

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

$\therefore \frac{4}{5}$ is not a zero of $p(x)$.

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

Solution:

For, $x=1, -1$;

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

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

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

$\therefore 1, -1$ 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) $p(x)=lx+m$, $x=-\frac{m}{l}$

Solution:

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

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

$\therefore -\frac{m}{l}$ is a zero of p(x).

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

Solution:

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

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

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

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

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

Solution:

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

$\therefore p(\frac{1}{2})=2(\frac{1}{2})+1=1+1=2\neq 0$

$\therefore \frac{1}{2}$ is not a zero of p(x).

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

(i) p(x) = x + 5

Solution:

$p(x)=x+5$

$\Rightarrow x+5=0$

$\Rightarrow x=-5$

$\therefore$-5 is a zero polynomial of the polynomial p(x).

(ii) p(x) = x – 5

Solution:

$p(x)=x-5$

$\Rightarrow x-5=0$

$\Rightarrow x=5$

$\therefore 5$ is a zero polynomial of the polynomial p(x).

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

Solution:

$p(x)=2x+5$

$\Rightarrow 2x+5=0$

$\Rightarrow 2x=-5$

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

$\therefore x=-\frac{5}{2}$ is a zero polynomial of the polynomial p(x).

(iv)p(x) = 3x – 2

Solution:

$p(x)=3x-2$

$\Rightarrow 3x-2=0$

$\Rightarrow 3x=2$

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

$\therefore x=\frac{2}{3}$ 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≠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 ≠ 0, c, d are real numbers.

Solution:

$p(x)= cx + d$

$\Rightarrow cx + d =0$

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

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