NCERT solutions for class 9 Maths Polynomials Ex 2.2

Q1. 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 $f(x)=5x-4x^2+3$ to get $f(0)=5(0)-4(0)^2+3$

= 0-0+3

=3

Therefore, we conclude that at $x=0$, 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 0 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 $x=2$, the value of the polynomial $5x-4x^2+3$ is -3.

Q2. 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) $p(x) = (x-1)(x+1)$

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

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 $p(1)$:

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

At $p(2)$:

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

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

At $p(0)$:

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

At $p(1)$:

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

At $p(2)$:

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

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

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 $p(2)$:

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

Q3. 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 $p(x)=3x+1$ at $x=-\frac{1}{3}$ 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 $x=-\frac{1}{3}$ is a zero of the polynomial $p(x)=3x+1$.

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

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

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

Therefore, $x=\frac{4}{5}$ is not a zero of the polynomial $p(x)=5x-\pi$.

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

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 $x=1$

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

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

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

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 $x=2$

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

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

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

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

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

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

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

$p(x)=2x+1$

Q4. 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.

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

$ax+b$, where $a\neq 0$ and $b\neq 0$, and a and b are real numbers,

we need to find $p(x)=0$.

On putting $p(x)=x+5$ equal to 0, we get

$x+5=0 \quad \Rightarrow x=-5$

Therefore, we conclude that the zero of the polynomial $p(x)=x+5$ is -5.

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

$ax+b$, where $a\neq 0$ and $b\neq 0$, and a and b are real numbers,

we need to find $p(x)=0$.

On putting $p(x)=x-5$ equal to 0, we get

$x-5=0 \quad \Rightarrow x=5$

Therefore, we conclude that the zero of the polynomial $p(x)=x-5$ is 5.

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

$ax+b$, where $a\neq 0$ and $b\neq 0$, and a and b are real numbers,

we need to find $p(x)=0$.

On putting $p(x)=2x+5$ equal to 0, we get

$2x+5=0 \qquad \Rightarrow x=\frac{-5}{2}$

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

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

$ax+b$, where $a\neq 0$ and $b\neq 0$, and a and b are real numbers,

we need to find $p(x)=0$.

On putting $p(x)=3x-2$ equal to 0, we get

$3x-2=0 \quad \Rightarrow x=\frac{2}{3}$

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

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

$ax+b$, where $a\neq 0$ and $b\neq 0$, and a and b are real numbers,

we need to find $p(x)=0$.

On putting $p(x)=3x$ equal to 0, we get

$3x=0 \qquad \Rightarrow x=0$

Therefore, we conclude that the zero of the polynomial $p(x)=3x$ is 0.

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

$ax+b$, where $a\neq 0$ and $b\neq 0$, and a and b are real numbers,

we need to find $p(x)=0$.

On putting $p(x)=ax$ equal to 0, we get

$ax=0 \quad \Rightarrow x=0$

Therefore, we conclude that the zero of the polynomial $p(x) = ax, a \neq 0$ is 0.

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

$ax + b,$ where $a \neq 0$ and $b \neq 0,$ and a and b are real numbers,

we need to find $p(x) = 0$.

On putting $p(x) = cx + d$ equal to 0, we get

$cx + d = 0$

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

Therefore, we conclude that the zero of the polynomial $p(x) = cx + d, c \neq 0,\ c, d$ are real numbers. is $-\frac{d}{c}$.

*********** END **********