NCERT Solutions for Class 9 Maths Chapter 2 Polynomials Ex 2.3

Question 1.

Find the remainder when x^3+3x^2+3x+1 is divided by

(i) $x+1$

(ii) $x-\frac{1}{2}$

(iii) x

(iv) $x+\pi$

(v) $5+2x$

Solution:

(i) By long division method, we have

$$
\begin{array}{r|l}
 & x^2+2x+1 \\
\hline
x+1 & x^3+3x^2+3x+1 \\
 & x^3+x^2 \\
 & - \quad - \\
\hline
 & 2x^2+3x+1 \\
 & 2x^2+2x \\
 & - \quad - \\
\hline
 & x+1 \\
 & x+1 \\
 & - \quad - \\
\hline
 & 0
\end{array}
$$

Therefore, the remainder is 0

(ii) By long division method, we have

$$
\begin{array}{r|l}
 & x^2 + \frac{7}{2}x + \frac{19}{4} \\
\hline
x - \frac{1}{2} & x^3 + 3x^2 + 3x + 1 \\
 & \underline{\overset{-}{x^3} \overset{+}{-} \frac{x^2}{2}} \\
 & \frac{7}{2}x^2 + 3x + 1 \\
 & \underline{\overset{-}{\frac{7}{2}x^2} \overset{+}{-} \frac{7}{4}x} \\
 & \frac{19}{4}x + 1 \\
 & \underline{\overset{-}{\frac{19}{4}x} \overset{+}{-} \frac{19}{8}} \\
 & \frac{27}{8}
\end{array}
$$

Therefore, the remainder is $\frac{27}{8}$

(iii)

$$
\begin{array}{r|l}
 & x^2 + 3x + 3 \\
\hline
x & x^3 + 3x^2 + 3x + 1 \\
 & \underline{\overset{-}{x^3}} \\
 & 3x^2 + 3x + 1 \\
 & \underline{\overset{-}{3x^2}} \\
 & 3x + 1 \\
 & \underline{\overset{-}{3x}} \\
 & 1
\end{array}
$$

Therefore, the remainder is 1

(iv)

$$x^2 + (3-\pi)x + (3 - 3\pi + \pi^2$$

$$x+\pi \;\big)\; x^3 + 3x^2 + 3x + 1$$

$$\underline{\overset{-}{x^3} + \overset{-}{\pi x^2}}$$

$$(3-\pi)x^2 + 3x + 1$$

$$\underline{\overset{-}{(3-\pi)x^2} + \overset{-}{(3-\pi)\pi x}}$$

$$[3 - 3\pi + \pi^2]x + 1$$

$$\underline{\overset{-}{[3 - 3\pi + \pi^2]x} + \overset{-}{(3 - 3\pi + \pi^2)\pi}}$$

$$[1 - 3\pi + 3\pi^2 - \pi^3]$$

Therefore, the remainder is $[1 - 3\pi + 3\pi^2 - \pi^3]$

(v)

$$\frac{x^2}{2} + \frac{x}{4} + \frac{7}{8}$$

$$2x+5 \;\big)\; x^3 + 3x^2 + 3x + 1$$

$$\underline{\overset{-}{x^3} + \overset{-}{\frac{5}{2}x^2}}$$

$$\frac{x^2}{2} + 3x + 1$$

$$\underline{\overset{-}{\frac{x^2}{2}} + \overset{-}{\frac{5x}{4}}}$$

$$\frac{7x}{4} + 1$$

$$\underline{\overset{-}{\frac{7}{4}x} + \overset{-}{\frac{35}{8}}}$$

$$-\frac{27}{8}$$

Question 2.

Find the remainder when $x^3 - ax^2 + 6x - a$ is divided by $x - a$

Solution:

By long division method, we have

$$
\begin{array}{r|l}
 & x^2 + 6 \\
\hline
x - a & x^3 - ax^2 + 6x - a \\
 & x^3 - ax^2 \\
 & - \quad + \\
\hline
 & \qquad\qquad 6x - a \\
 & \qquad\qquad 6x - 6a \\
 & \qquad\qquad - \quad + \\
\hline
 & \qquad\qquad\qquad 5a
\end{array}
$$

Therefore, remainder obtained is 5a when $x^3 - ax^2 + 6x - a$ is divided by $x - a$

Question 3.

Check whether $7 + 3x$ is a factor of $3x^3 + 7x$

Solution:

We have to divide $3x^3 + 7x$ by $7 + 3x$

If remainder comes out be 0 then $7 + 3x$ will be a factor of $3x^3 + 7x$

By long division method,

$$x^2 - \frac{7}{3}x + \frac{70}{9}$$

$$3x - 7 \;\Big)\; 3x^3 + 0x^2 + 7x$$

$$\begin{array}{r} 3x^3 + 7x^2 \\ - \quad - \\ \hline -7x^2 + 7x \\ -7x^2 - \frac{49x}{3} \\ + \quad + \\ \hline \frac{70x}{3} \\ \frac{70x}{3} + \frac{490}{9} \\ - \quad - \\ \hline \frac{-490}{9} \end{array}$$

As remainder is not zero so 7 + 3x is not a factor of $3x^3 + 7x$