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Class :-09(Maths)

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

(i) $x+1$

Solution:

$$x+1=0$$

$$\Rightarrow x = -1$$

∴Remainder:

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

$$= -1+3-3+1$$

$$= 0$$

(ii) $x-1/2$

Solution:

$$x-1/2=0$$

$$\Rightarrow x = 1/2$$

∴Remainder:

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

$$= (1/8)+(3/4)+(3/2)+1$$

$$= 27/8$$

(iii) x

Solution:

$$x=0$$

∴Remainder:

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

$$= 1$$

(iv) $x+\pi$

Solution:

$$x + \pi = 0$$

$$\Rightarrow x = -\pi$$

∴ Remainder:

$$\begin{aligned} p(0) &= (-\pi)^3 + 3(-\pi)^2 + 3(-\pi) + 1 \\ &= -\pi^3 + 3\pi^2 - 3\pi + 1 \end{aligned}$$

(v) $5+2x$

Solution:

$$5 + 2x = 0$$

$$\Rightarrow 2x = -5$$

$$\Rightarrow x = -5/2$$

∴ Remainder:

$$\begin{aligned} (-5/2)^3 + 3(-5/2)^2 + 3(-5/2) + 1 &= (-125/8) + (75/4) - (15/2) + 1 \\ &= -27/8 \end{aligned}$$

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

Solution:

$$\text{Let } p(x) = x^3 - ax^2 + 6x - a$$

$$x - a = 0$$

$$\therefore x = a$$

Remainder:

$$\begin{aligned} p(a) &= (a)^3 - a(a^2) + 6(a) - a \\ &= a^3 - a^3 + 6a - a = 5a \end{aligned}$$