STD – 9 MATHS

CHAPTER - 2

polynomials

EXERCISE - 2.4 Q : 1,2

1. Determine which of the following polynomials has

   $(x + 1)$ a factor:

(i) $x^3 + x^2 + x + 1$

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

  The zero of $x + 1$ is -1. [$x + 1 = 0$ means $x = -1$]

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

$= -1 + 1 - 1 + 1$

$= 0$

- By factor theorem, $x + 1$ is a factor of $x^3 + x^2 + x + 1$

(ii) $x^4 + x^3 + x^2 + x + 1$

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

  The zero of $x + 1$ is -1. . [$x + 1 = 0$ means $x = -1$]

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

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

$= 1 \neq 0$

- By factor theorem, $x + 1$ is not a factor of

  $x^4 + x^3 + x^2 + x + 1$

(iii) $x^4 + 3x^3 + 3x^2 + x + 1$

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

  The zero of $x + 1$ is -1.

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

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

$= 1 \neq 0$

- By factor theorem, $x + 1$ is not a factor of

  $x^4 + 3x^3 + 3x^2 + x + 1$

(iv) $x^3 - x^2 - (2 + \sqrt{2})\,x + \sqrt{2}$

➢ Let $p(x) = x^2 - x^2\,(2 + \sqrt{2})x + \sqrt{2}$

The zero of $x + 1$ is -1.

$p(-1) = (-1)^3 - (-1)^2 - (2 + \sqrt{2})\,(-1) + \sqrt{2}$

$= -1 -1 + 2 + \sqrt{2} + \sqrt{2}$

$= 2\sqrt{2} \neq 0$

➢ By factor theorem, $x+1$ is not a factor of

$x^3 - x^2 - (2 + \sqrt{2})x + \sqrt{2}$

2. Use the Factor Theorem to determine whether g(x) is a factor of p(x) in each of the following cases:

(i) $p(x) = 2x^3 + x^2 - 2x - 1,\ g(x) = x + 1$

- $p(x) = 2x^3 + x^2 - 2x - 1,\ g(x) = x + 1$

  $g(x) = 0$

$\Rightarrow x + 1 = 0$

$\Rightarrow x = -1$

$\therefore$ Zero of g(x) is -1.

Now,

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

$$= -2 + 1 + 2 - 1$$

$$= 0$$

By factor theorem, g(x) is a factor of p(x).

(ii) $p(x) = x^3 + 3x^2 + 3x + 1$, $g(x) = x + 2$

- $p(x) = x^3 + 3x^2 + 3x + 1$, $g(x) = x + 2$

  $g(x) = 0$

$\Rightarrow x + 2 = 0$

$\Rightarrow x = -2$

$\therefore$ Zero of $g(x)$ is -2.

Now,

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

$$= -8 + 12 - 6 + 1$$

$$= -1 \neq 0$$

- By factor theorem, $g(x)$ is not a factor of $p(x)$.

(iii) $p(x) = x^3 - 4x^2 + x + 6, g(x) = x - 3$

- $p(x) = x^3 - 4x^2 + x + 6, g(x) = x – 3$

$g(x) = 0$

$\Rightarrow x - 3 = 0$

$\Rightarrow x = 3$

$\therefore$ Zero of $g(x)$ is 3.

Now,

$$p(3) = (3)^3 - 4(3)^2 + (3) + 6$$

$$= 27 - 36 + 3 + 6$$

$$= 0$$

- **By factor theorem, g(x) is a factor of p(x).**

Thanks

For watching