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

= 0

$$\triangleright$$
 Let p(x) = x³ + x² + x + 1

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

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

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

ightharpoonup Let p(x) = x² - x² (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

∴ 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

∴ Zero of g(x) is -2.

Now,

$$p(-2) = (-2)^3 + 3(-2)^2 + 3(-2) + 1$$
$$= -8 + 12 - 6 + 1$$
$$= -1 \neq 0$$

 \triangleright 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

$$\Rightarrow x = 3$$

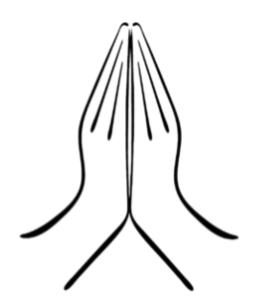
∴ Zero of g(x) is 3.

Now,

$$p(3) = (3)^3 - 4(3)^2 + (3) + 6$$
$$= 27 - 36 + 3 + 6$$
$$= 0$$

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

Thanks



For watching