

# Mathematics

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(Chapter – 2) (Polynomials)(Exemplar Problems)

(Class – IX)

## Exercise 2.4

### Question 4:

Without actual division, prove that  $2x^4 - 5x^3 + 2x^2 - x + 2$  is divisible by  $x^2 - 3x + 2$ . [Hint: Factorise  $x^2 - 3x + 2$ ]

### Answer 4:

Given polynomials:

$$f(x) = 2x^4 - 5x^3 + 2x^2 - x + 2 \text{ and } g(x) = x^2 - 3x + 2$$

$$\begin{aligned} \text{Here, } g(x) &= x^2 - 3x + 2 \\ &= x^2 - x - 2x + 2 \\ &= x(x - 1) - 2(x - 1) \\ &= (x - 2)(x - 1) \end{aligned}$$

Now, we have to show that  $x - 2$  and  $x - 1$  are the factors of  $f(x)$ .

Using factor theorem,

When  $f(x)$  is divided by  $x - 2$ , the remainder is given by

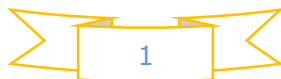
$$\begin{aligned} f(2) &= 2(2)^4 - 5(2)^3 + 2(2)^2 - (2) + 2 \\ &= 32 - 40 + 8 - 2 + 2 \\ &= 42 - 42 \\ &= 0 \end{aligned}$$

$\Rightarrow x - 2$  is a factor of  $f(x)$  ... (i)

Similarly, when  $f(x)$  is divided by  $x - 1$ , the remainder is given by

$$\begin{aligned} f(1) &= 2(1)^4 - 5(1)^3 + 2(1)^2 - (1) + 2 \\ &= 2 - 5 + 2 - 1 + 2 \\ &= 6 - 6 \\ &= 0 \end{aligned}$$

$\Rightarrow x - 1$  is a factor of  $f(x)$  ... (ii)



# *Mathematics*

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From equations (i) and (ii), we get

$x - 2$  and  $x - 1$  are the factors of  $f(x)$

$\Rightarrow x^2 - 3x + 2$  is a factor of  $f(x)$ .

Hence,  $f(x) = 2x^4 - 5x^3 + 2x^2 - x + 2$  is divisible by  $x^2 - 3x + 2$ .

