

Mathematics

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

Exercise 2.4

Question 2:

The polynomial $p(x) = x^4 - 2x^3 + 3x^2 - ax + 3a - 7$ when divided by $x + 1$ leaves the remainder 19. Find the values of a . Also find the remainder when $p(x)$ is divided by $x + 2$.

Answer 2:

Given polynomials:

$$p(x) = x^4 - 2x^3 + 3x^2 - ax + 3a - 7$$

Using remainder theorem,

When $p(x)$ is divided by $x + 1$, the remainder is given by

$$\begin{aligned} p(-1) &= (-1)^4 - 2(-1)^3 + 3(-1)^2 - a(-1) + 3a - 7 \\ &= 1 - 2(-1) + 3 - a(-1) + 3a - 7 \\ &= 1 + 2 + 3 + a + 3a - 7 \\ &= 4a - 1 \end{aligned}$$

According to question:

$$\begin{aligned} p(-1) &= 19 \\ \Rightarrow 4a - 1 &= 19 \\ \Rightarrow 4a &= 20 \\ \Rightarrow a &= 5 \end{aligned}$$

Hence, $p(x) = x^4 - 2x^3 + 3x^2 - 5x + 15 - 7 = x^4 - 2x^3 + 3x^2 - 5x + 8$

When $p(x)$ is divided by $x + 2$, the remainder is given by

$$\begin{aligned} p(-2) &= (-2)^4 - 2(-2)^3 + 3(-2)^2 - 5(-2) + 8 \\ &= 16 - 2(-8) + 3(4) + 10 + 8 \\ &= 16 + 16 + 12 + 18 = 62 \end{aligned}$$

