

ASSIGNMENT 1 : QUESTION 11 (A)

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Given:

- $f(x) = x^3 + (kx + 8)x + k$
- Sum of remainders of $f(x)$ after dividing by $(x + 1)$ and $(x - 2)$ is 1

Find:

- Remainders of $f(x)$ after dividing by $(x + 1)$ and $(x - 2)$
- The value of k

Solution :

By the remainder theorem,

The remainder after dividing a polynomial $p(x)$ by $(x - r)$ is equal to $p(r)$.

Therefore,

$$f(x) \mod (x + 1) = f(-1)$$

$$f(x) \mod (x - 2) = f(2)$$

$$f(-1) = (-1)^3 + (k(-1) + 8) * (-1) + k$$

$$i.e. = -1 + k - 8 + k$$

$$i.e. = \underline{2k - 9}$$

$$f(2) = 2^3 + (2k + 8) * 2 + k$$

$$i.e. = 8 + 4k + 16 + k$$

$$i.e. = \underline{5k + 24}$$

$$\text{Given that } (2k - 9) + (5k + 24) = 1$$

$$\text{Rearranging, we get } 7k = -14$$

$$\text{Therefore } \underline{k = -2}$$

Substituting the value of k , we get

$$2k - 9 = -13$$

$$5k + 24 = 14$$

Therefore, the remainders are :

$$f(x) \% (x + 1) = -13$$

$$f(x) \% (x - 2) = 14$$