Assignment 1

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Problem 3a, ICSE 10 2018

Question 3

(a) If $(x + 2)$ and $(x + 3)$ are factors of $x^3 + ax + b$, find the values of 'a' and 'b'.

Solution :

According to the question:

$x + 2$ and $x + 3$ are factors of $x^3 + ax + b$.
Then, -2 and -3 are solutions of the equation

$$x^3 + ax + b = 0 \qquad (1)$$

On substituting $x = -2$ int the equation (1)

$$\Rightarrow (-2)^3 + a(-2) + b = 0$$
$$\Rightarrow 2a - b = -8$$

The value of b in terms of a is :

$$\Rightarrow b = 2a + 8 \qquad (2)$$

On substituting $x = -3$ in the equation (1)

$$\Rightarrow (-3)^3 + a(-3) + b = 0$$

$$\Rightarrow 3a - b = -27 \qquad (3)$$

On substituting equation (2) in equation(3)

$$\Rightarrow 3a - (2a + 8) = -27$$
$$\Rightarrow a - 8 = -27$$
$$\Rightarrow a = -19$$

Substitute value of 'a' in equation (2)

$$b = 2(-19) + 8$$
$$b = -30$$

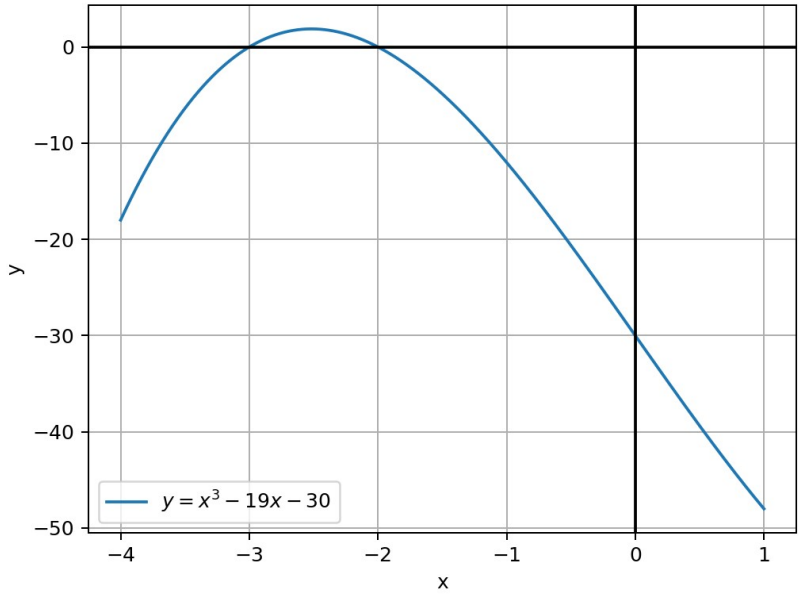
$\therefore$ The value of $a = -19$ and value of $b = -30$.
Using values of 'a' and 'b', equation (1) can be re-written as :

$$x^3 - 19x - 30 = 0 \qquad (4)$$

This can be verified by plotting the graph of the equation

$$y = x^3 - 19x - 30$$

In the interval [-4,1], graph intersects $x-axis$ at $x = -3$ and $x = -2$.


0
−10
−20
−30
−40
−50
y
−4
−3
−2
−1
0
1
x
$y = x^3 - 19x - 30$