Solution for the Average Value of f(x) = x³ - 5x² + 30

Given Function:

f(x) = x³ - 5x² + 30

Interval:

0 ≤ x ≤ 4

Formula for Average Value:

The formula for the average value of f(x) over the interval [a, b] is:

Average Value = (1 / (b - a)) ∫[a, b] f(x) dx

Substituting a = 0 and b = 4:

Average Value = (1 / 4) ∫[0, 4] (x³ - 5x² + 30) dx

Finding the Integral of f(x):

∫ f(x) dx = ∫ (x³ - 5x² + 30) dx

= (x⁴ / 4) - (5x³ / 3) + 30x

Evaluating the Integral at the Bounds:

∫[0, 4] f(x) dx = [(4⁴ / 4) - (5(4³) / 3) + 30(4)] - [(0⁴ / 4) - (5(0³) / 3) + 30(0)]

= [64 - (320 / 3) + 120] - [0]

= 64 + 120 - (320 / 3)

= (192 / 3) + (360 / 3) - (320 / 3)

= (232 / 3)

Dividing by the Interval Length:

Average Value = (232 / 3) / 4 = 232 / 12 = 58 / 3 ≈ 19.33

The average value of the function f(x) over the interval [0, 4] is approximately:

19.33