Instructions

Complete the following exercises on complex calculus. Show all your work for full credit.

1. Evaluate the integral:

∫ (2x^3 - 4x + 1) dx

2. Determine the limit:

lim (x → 3) (x^2 - 9) / (x - 3)

3. Solve the following differential equation:

dy/dx = 3y + 2

4. Find the critical points of the function:

f(x) = x^4 - 8x^3 + 18x^2

5. Use the Mean Value Theorem to find c in the interval [1, 4] for the function:

f(x) = 2x^2 - 3x + 1

6. Explain the significance of the complex number i in calculus.

7. Prove or disprove: The function f(x) = x^3 - 6x^2 + 9x is increasing on the interval (0, 3).