Professional Mathematics Assignment

Total Points: 150 | Questions: 6 | Date: November 17, 2025

Instructions

This assignment demonstrates various mathematical notation formats. Solve all problems showing complete work for full credit. **Important:** Use proper mathematical notation in your solutions.

Important: Show all work for full credit. Write legibly and organize your answers clearly.

Question 1

25 points | Easy | Long Answer

Solve the quadratic equation:

$$x^2 - 4x + 3 = 0$$

Use the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Show all steps clearly.

Answer:

Question 2

30 points | Hard | Long Answer

Evaluate the integral:

$$\int x^2 \sin(x)\, dx$$

Use integration by parts:

$$\int u\, dv = uv - \int v\, du$$

Answer:

Question 3

15 points | Medium | Short Answer

Find

$$\lim_{x \to 0} \frac{\sin(3x)}{x}$$

Answer:

Question 4

20 points | Medium | Multiple Choice

What is the derivative of $f(x) = x^3\cos(x)$?

A.

$$3x^2\cos(x) - x^3\sin(x)$$

B.

$$3x^2\cos(x) + x^3\sin(x)$$

C.

$$x^2\cos(x) - 3x^3\sin(x)$$

D.

$$3x^2\sin(x) + x^3\cos(x)$$

Question 5

25 points | Medium | Long Answer

Consider the physics problem with equation `[Equation physics1]`. Given initial velocity `[Equation physics2]` and acceleration `[Equation physics3]`, find the final velocity using `[Equation physics4]`.

Answer:

Question 6

35 points | Hard | Long Answer

Prove that for any triangle with sides a, b, c:

$$\cos(C) = \frac{a^2 + b^2 - c^2}{2ab}$$

This is known as the Law of Cosines.

Answer: