

# Calculus Test

## Instructions

Answer all questions. Show all work clearly and neatly.

## Part A: Derivatives

1. Compute the derivative of each of the following functions:

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

(b)  $g(x) = \sqrt{x} + \frac{1}{x}$

(c)  $h(x) = e^{2x} \ln(x)$

2. Find the equation of the tangent line to the curve  $y = 2x^3 - x^2 + 3$  at the point where  $x = 1$ .
3. Determine the derivative of  $y = \sin(2x) \cdot e^x$ .
4. If  $f(x) = \sqrt{x^2 + 1}$ , find  $f'(x)$  using the chain rule.