

Name: _____

Calculus 1: Review (Test 2)

1. Compute the derivative of the following function.

$$f(x) = (2x^2 + 4x + 3)^6$$

2. Compute the derivative of the following function.

$$f(x) = \sin(5x^2 + 4x + 3)$$

3. Compute the derivative of the following function.

$$f(x) = \frac{\sin(x)}{x^3 + 5x + 3}$$

4. Compute the derivative of the following function.

$$f(x) = \frac{(x^2 - 4x + 2)^2}{\sin(x) \cos(x)}$$

5. Compute the derivative of the following function.

$$f(x) = \sqrt[3]{x^3 + 2x - 7}$$

6. Compute the second derivative of the following function.

$$y(x) = \left(1 + \frac{5}{x}\right)^4$$

7. Find an equation for the line tangent to

$$f(x) = \sqrt{x^2 - 2x + 8}$$

at $x = 0$.

8. Are there any points on the curve

$$y = \frac{3}{2}x + \frac{1}{2x + 1}$$

where the tangent line has slope $-1/2$? If so, find them.

9. Consider the equation

$$y^2 + xy + x = 1.$$

Suppose y is a function of x defined implicitly by this equation.

- (a) If $x = 3$, what are the possible values of $y(x)$?
- (b) Suppose further that y is differentiable. Find equations for the lines tangent to this curve when $x = 3$.

10. Use implicit differentiation to find a formula for $\frac{dy}{dx}$ in terms of x and y , where y is defined implicitly by the following equation.

$$2y^5 + x^3y^2 - x^3 = 1$$

11. Suppose y is a twice-differentiable function defined implicitly by $x^5 + y^5 = 1$. Find a formula for $\frac{d^2y}{dx^2}$.