Calculus 1

Test 2

Form A

Spring 2016

Name: _____

Date: _____

READ THESE INSTRUCTIONS CAREFULLY!

- Circle or underline your final written answer.

- Justify your reasoning and show your work.

- If you run out of space, make a note and continue your work on the back of a page.

1. (10 pts.) Compute the derivative of the following function.

$$f(x) = (2x^2 + 7x + 7)^5$$

2. (10 pts.) Compute the derivative of the following function.

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

3. (10 pts.) Compute the derivative of the following function.

$$f(x) = \frac{\cos(x)}{x^3 + 5x + 2}$$

4. (10 pts.) Compute the derivative of the following function.

$$f(x) = \frac{(x^2 - 5x + 4)^3}{\sin(x)\cos(x)}$$

5. (10 pts.) Compute the derivative of the following function.

$$f(x) = \sqrt[4]{x^3 + 6x - 3}$$

6. (10 pts.) Compute the second derivative of the following function.

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

7. (10 pts.) Find an equation for the line tangent to

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

at $x = -3$.

8. (10 pts.) Are there any points on the curve

$$y = \frac{15}{4}x + \frac{1}{4x - 3}$$

where the tangent line has slope -1/4? If so, find them.

9. (10 pts.) Consider the equation
$$y^2 + xy + x = 1.$$
Suppose y is a function of x defined implicitly by this equation.

   (a) If $x = 4$, 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 $x = 4$.

10. (10 pts.) 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.
$$2y^6 + x^3y^3 - x^2 = 2$$

Bonus. Suppose y is a twice-differentiable function defined implicitly by $x^4 + y^6 = 1$. Find a formula for $\frac{d^2y}{dx^2}$ in terms of x and y.