

Test 1

MA 125-CT

October 3, 2013

Name: _____

Signature: _____

SHOW ALL YOUR WORK!

If you have time, find a way to check your answers.

Part 1

1. [6 points] Find the derivative of the function $h(s) = s^4 \tan(s)$.
2. [6 points] Find the values of x for which the curve $y = x^3 - 4x^2 + 4x + 2$ has a horizontal tangent line.
3. [6 points] Find the derivative of the function $f(x) = \frac{x \sin x}{x + 1}$.

4. [6 points] Find the second derivative y'' of the function $y = h(u) = \sin(u^2)$.

5. [6 points] Find y' if $y = (\sin(7x))^3$.

6. [6 points] Find y' if $y = x^2 \cos(x)$.

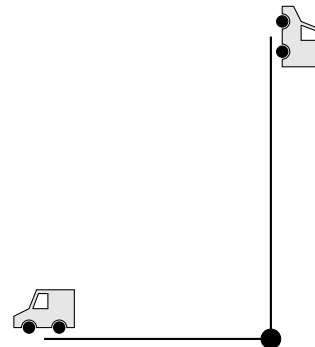
7. [6 points] Use implicit differentiation to find the derivative $\frac{dy}{dx}$ if $\cos(xy) = x$.

Part 2

1. [11 points] Use implicit differentiation to find the derivative $\frac{dy}{dx}$ if $y^3 = \cos(xy)$.

2. [13 points] Find $\frac{d^2}{dx^2} (x \tan(x))$.

3. [16 points] Mail truck **A** is heading directly west away from the Madison Post Office at 50 mph. At the same time, mail truck **B** is heading directly north away from the post office at 30 mph. How fast is the distance between the two trucks changing when **A** is 4 miles and **B** is 3 miles from the post office?



4. [18 points] Consider the equation

$$x^2 + xy + y^2 - 3 = 0$$

in which y is implicitly defined as a function of x .

- (a) Use implicit differentiation to find $\frac{dy}{dx}$.

- (b) Find y' at the point $(-1, 2)$?

- (c) Find an equation of the tangent line to the curve $x^2 + xy + y^2 - 3 = 0$ at the point $(-1, 2)$.