Test 3 **MA 125-8C** **October 29, 2013**

Name: _____ **Signature:** _____

SHOW ALL YOUR WORK!

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

Part 1

1. [5 points] Find y' if $y = \frac{e^{-2x}}{x^2+1}$.

2. [5 points] Find the limit: $\lim_{t\to\infty} e^{-t^3}$

3. [5 points] Find the values of x for which the curve $y = \frac{\ln x}{x}$ has a horizontal tangent line.

4. [5 points] Find the limit: $\lim_{t \to \infty} \frac{e^x}{x^2}$

5. [5 points] Evaluate $\sin^{-1}\left(\frac{1}{2}\right)$

6. [5 points] Simplify the expression $\cos(\sin^{-1}(x))$

Part 2

1. [12 points] Use logarithmic differentiation to calculate the derivative of

$$y = (x^4 + 4)^4 (x^3 + 3)^3$$

2. [15 points] Use logarithmic differentiation to calculate the derivative of

$$y = x^{2\tan(x)}$$

3. [15 points]

   (a) Find the linearization of the function $y(x) = \sqrt{x}$ at $x = 4$.

   (b) Use the linearization to estimate $\sqrt{3.6}$.

4. [14 points] Differentiate $f(s) = \tan^{-1}(e^s)$

5. [14 points] If $f(t) = e^{\cos(t)} + \cos(e^t)$, find $f'(t)$.