Name:_____

**MA-125-6C; Spring 2013, Exam III**

# Part I

**Part I consists of 6 questions, each worth 5 points. Clearly show your work for each of the problems listed.**

Find $y'$ if:

(1) $y = x^4 \cos^{-1}(x)$

(2) $y = \frac{\ln(x)}{x^3}$

(3) $y = e^{x^5} \cos(x)$

(4) $y = (\ln(\sec(x)))^2$

(5) Evaluate the limit

$$\lim_{x \to 4} \frac{\sin(\frac{\pi x}{8})}{\sqrt{x^2 + 9}}$$

(6) Evaluate the limit

$$\lim_{x \to \infty} \frac{e^x + 5x^2}{e^{2x}}$$

# Part II

**Part II consists of 6 problems each worth 12 points. You must show the relevant steps and justify your answer to earn credit. Simplify your answer when possible.**

(1) Find $y'$ if $y = x^3 \sin^{-1}(x^2)$

(2) Find $y'$ if $y = [\cos(x)]^{\sin(x)}$.

(3) Find $y'$ if $y = \frac{(\cos(x))^4 (x)^2}{(7x+8)^{11}}$

(4) Simplify $y = \cos(\sin^{-1}(x))$, then find $y'$.

(5) Use a linear approximation of the function $y = f(x) = \sqrt[3]{x}$ at an appropriate point $x = a$ to estimate the value of $\sqrt[3]{28}$.

(6) Calculate the limit $\lim_{x \to 0^+} x^{\sqrt{x}}$.