MA 125 - 6D, CALCULUS I
March 10, 2014

Name (Print last name first): .....

Student Signature: .....

TEST II

No calculators are allowed!

PART I

Part I consists of 7 questions. Clearly write your answer (only) in the space provided after each question. You do not need not to show your work for this part of the test. No partial credit is awarded for this part of the test!

Each question is worth 8 points.

Question 1

Calculate the derivative of the function $f(x) = x\cos^{-1}(x)$.

Answer: .....

Question 2

Calculate the derivative of the function $f(x) = \frac{\ln(x)}{x}$.

Answer: .....

Question 3

Calculate the derivative of the function $f(x) = \tan^{-1}(x^3)$.

Answer: .....

Question 4

Calculate the derivative of the function $f(x) = e^{x^2}$.

Answer: .....

Question 5

Calculate the derivative of the function $f(x) = \ln(x)e^x$.

Answer: .....

Question 6

Calculate the derivative of the function $f(x) = \sin^{-1}(e^{-x})$.

Answer: .....

Question 7

Calculate the derivative of the function $f(x) = \frac{x^3}{\tan(x)}$.

Answer: .....

PART II

Part II consists of 4 problems. You must show your work on this part of the test to get full credit. Displaying only the final answer (even if correct) without the relevant steps will not get full credit.

Each problem is worth 12 points.

Problem 1

(a) Using logarithmic differentiation calculate the derivative of the function $f(x) = x^{\sin(x)}$.

(b) Using logarithmic differentiation calculate the derivative of the function

$$f(x) = \frac{(x^3-1)^5(x+2)^8}{(x^2-7)^6(x-2)^5}.$$

Problem 2

(a) Find the derivative of the function $f(x) = \frac{x}{\cos(x)}$.

(b) Using the result of the previous question find the equation of the tangent line at point $x_0 = 0$.

Problem 3

(a) Find the derivative of the function $f(x) = xe^{-x}$.

(b) Using the result of the previous question find linearization of the function near point $x_0 = 0$.

Problem 4

The surface area of a cube is given by $S = 6x^2$ where x is the length of an edge. If the length of an edge is measured as 10 cm with a possible error 0.2 cm, what are the absolute and relative errors for the surface area?