MA 125 6C, CALCULUS I

November 29, 2017

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

PART I

Part I consists of 7 questions. Clearly write your answer in the space provided after each question. You must explain your answers!!!

Each question is worth 8 points.

Question 1

If $f(x) = \ln(\sin(x))$, find $f'(x)$.

Question 2

If $f(x) = e^{\sin(x)}$, find $f'(x)$

Question 3

Evaluate $\int x^3\sqrt{2x^4+5}\,dx$

Question 4

Solve $e^{2x+4} = 5$

Question 5

Show that the function $f(x) = x^5+3x^3+2x+1$ is one-to-one and find the derivative $(f^{-1})'(7)$.

Question 6

Solve $\ln(3x + 1) = 2$

Question 7
Evaluate $\int_0^{\pi/4} \tan(x)\,dx$

Question 8
Use Newton's method to find the second approximate solution x_2 to $f(x) = x^5 + x + \frac{1}{10}$ if $x_1 = 0$.

PART II

Points for each problem are indicated

Problem 1 [14 points]

Use logarithmic differentiation to find the derivative of the function

$$f(x) = \frac{(x^5+5)^5 \sqrt[3]{x^3+1}}{\sqrt[6]{(x^6+6)^6}}.$$

You do not need to simplify the answer but it must be expressed in terms of x only.

Problem 2 [22 points]

Graph the function $f(x) = xe^{2x}$. Find:
a. x and y intercepts
b. $\lim_{x\to\infty} xe^{2x}$
c. Use values (like $x = -2, -5, -10$) to guess the limit $\lim_{x\to-\infty} xe^{2x}$ and the horizontal asymptote (if any).
d. Find the derivative and critical values
e. Find where $f(x)$ is increasing and decreasing
f. Find local/absolue maximum/minimum (if any)
g. Graph the function