MATH 1300A-MIDTERM # 1-2012

NAME and I.D.#_____

Instructions: This midterm exam consists of 4 multiple choice questions and 3 long answer questions. The multiple choice questions are worth 5 points each, and the long answer questions are as indicated. The total value of the exam is 60 points.

Place your answers to the multiple choice questions in the boxes below. All your work on the long answer questions must be clearly marked. **You may use the backs of pages.**

For long answer questions, YOU MUST SHOW YOUR WORK.

NO CALCULATORS. NO BOOKS. NO NOTES.

If you need additional scrap paper, it will be provided by the proctors.

Multiple Choice Answers:

#1	#2	#3	#4

Multiple Choice Questions (1-4)

Question 1 *Solve*

$$3^{2x} = 2^{x+1}$$

A) $x = \frac{3\ln(2)}{2\ln(3)}$ **B)** $x = \frac{-\ln(3)}{\ln(2)}$ **C)** $x = \frac{\ln(3)}{\ln(2)-\ln(3)}$ **D)** $x = \frac{\ln(2)}{\ln(3)+2\ln(2)}$ **E)** $x = \frac{\ln(2)}{2\ln(3)-\ln(2)}$

Question 2 *If* $f(x) = \frac{x}{x^2+1}$, *find* $f'(2)$.

A) $\frac{3}{5}$ **B)** $\frac{1}{25}$ **C)** $\frac{-3}{25}$ **D)** $\frac{1}{5}$ **E)** $\frac{-7}{25}$

Question 3 *Find the equation of the tangent line of the function* $f(x) = \frac{1}{\sqrt{3x+1}}$ *at* $x = 1$.

A) $y = -\frac{3}{16}x - \frac{8}{3}$ **B)** $y = -\frac{3}{16}x + \frac{11}{16}$ **C)** $y = \frac{1}{16}x - \frac{3}{16}$ **D)** $y = \frac{1}{16}x + \frac{7}{16}$

E) $y = \frac{1}{16}x - \frac{2}{3}$

Question 4 *Find the following limit.*

$$\lim_{x \to 2} \frac{x-2}{x^3-8}$$

A) 12 **B)** $\frac{1}{3}$ **C)** $\frac{1}{12}$ **D)** ∞ **E)** The limit does NOT exist.

Long Answer Questions (5-7)

Question 5 (14 points)

Using only the definition of derivative as a limit, calculate $f'(x)$ where

$$f(x) = \frac{2}{3-x}.$$

Solution

Question 6 (12 points) For the following, you do not need to simplify your answers.

- *Suppose 1,000 dollars is invested at a rate of 4 percent, compounded 6 times per year. How much money is in the account after 3 years?*
- *Suppose 1,000 dollars is invested at a rate of 4 percent, compounded 6 times per year. How long does it take for the money to triple?*
- *Suppose 2,000 dollars is invested in an account that compounds continuously. The interest is unknown, but you do know that the money tripled in 21 years. What must the interest rate have been?*

Solution

Question 7 (10 points)

The function $y = f(x)$ is defined implicitly by

$$\sqrt{2x + 3y} = y + 2$$

Find the equation of the tangent line to the graph determined by the above equation at $(3, 1)$.

Solution

Space for additional work