MATH 1300 A & B-MIDTERM # 2 Fall-2015

PROFESSORS: Richard Blute and Termeh Kousha

Last Name: _____ **First Name:** _____
ID# _____

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 exam is out of 50.
- **Place your answers to the multiple choice questions in the boxes below.**
- **For long answer questions, YOU MUST SHOW YOUR WORK**
- You may use the backs of pages. If you need additional scrap paper, it will be provided by the proctors.

NO CALCULATORS. NO BOOKS. NO NOTES.

TURN OFF YOUR CELL PHONES AND PUT THEM AWAY.

ANSWERS:

#1.	#2	#3	#4

Multiple Choice Section Questions (1-4)

Question 1. *Suppose that the demand function for a product is given by* $p = 16 - 3\sqrt{x}$. *What is the elasticity of demand when* $x = 16$*? Is demand elastic or inelastic?*

A) $\eta = -\frac{2}{3}$, elastic **B)** $\eta = -\frac{14}{9}$, inelastic **C)** $\eta = -\frac{14}{9}$, elastic
D) $\eta = -\frac{2}{3}$, inelastic **E)** $\eta = -\frac{1}{9}$, inelastic

Question 2. *Suppose* $f'(x) = \frac{1}{x} + 3x^2$, *and that* $f(1) = 3$. *Find* $f(4)$.

A) $\ln 2 + 6$ **B)** $\frac{-3}{4}$ **C)** $-2\ln 2 + 65$ **D)** $2\ln 2 + 66$ **E)** $e^4 - \ln 2$.

Question 3. *Find the interval(s) on which the following function is decreasing:*

$$f(x) = \frac{2}{x^2} + \frac{x}{2}$$

A) $(-\infty, 2)$ **B)**$(-\infty, 0) \cup (2, \infty)$ **C)** $(0, 2)$ **D)**$(-2, \infty)$ **E)** $(-2, 2)$

Question 4. *The number of a certain type of bacteria increases exponentially. There are 50 present at an initial time and 150 present 2 hours later. After how many hours will there be 250?*

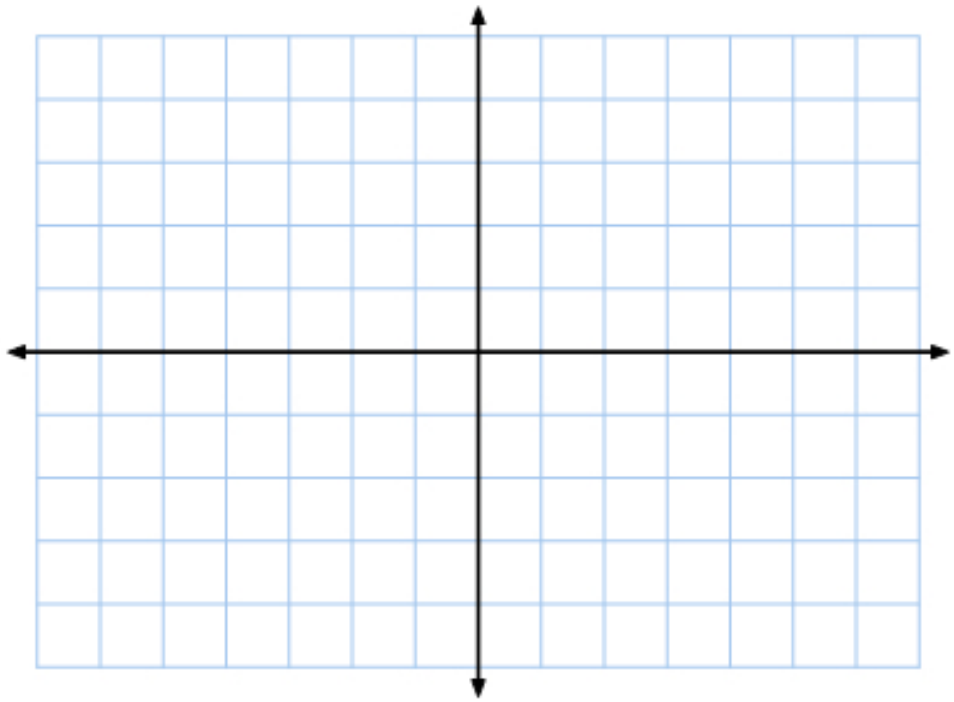
A) $\frac{3\ln(6)}{\ln(2)}$ **B)**$\frac{2\ln(5)}{\ln(3)}$ **C)** 4 **D)**5 **E)**$\frac{3\ln(2)}{\ln(5)}$

Long Answer Section Questions (5-7)

Question 5. (12 points) *For the following function find the appropriate information (listed next page) to sketch the graph of the following function.*

$$f(x) = \frac{x-1}{x+1}$$

Graph of $f(x)$



1. Find the domain of the function
2. Find the y-intercept and plot it
3. Find the x-intercepts and plot them
4. Find the horizontal asymptotes and plot them
5. Find the vertical asymptotes and plot them
6. Find the critical numbers
7. Find the intervals of increase and decrease
8. Identify the relative extrema and plot them
9. Find the intervals of concave up and concave down
10. Identify the points of inflection and plot them
11. Fill in the rest of the graph using (7) and (9)

Question 6. (8 points)

For the following function, find all the critical points and determine their type.

$$f(x) = e^{(-x^3+3x^2+6)}.$$

Question 7. (10 points) *A bus company will charter a bus for tours. If a group contains exactly 36 people, each person pays \$60. In larger groups, every person's fare is reduced by \$0.50 for each person in excess of 36 people. Determine the size of the group for which the bus company's revenue will be greatest. What price will they charge this size group per person?*

Be sure to explain why your answer is an absolute maximum.

Space for additional work