MATH 1300A-MIDTERM # 2 Fall-2016

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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 total value of the exam is 50 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.

Cellular phones, unauthorized electronic devices or course notes (unless an open-book exam) are not allowed during this exam. Phones and devices must be turned off and put away in your bag. Do not keep them in your possession, such as in your pockets. If caught with such a device or document, the following may occur: you will be asked to leave immediately the exam, academic fraud allegations will be filed which may result in you obtaining a 0 (zero) for the exam.

By signing below, you acknowledge that you have ensured that you are complying with the above statement:
Signature: _____

For long answer questions, YOU MUST SHOW YOUR WORK.

NO CALCULATORS. NO BOOKS. NO NOTES.

Multiple Choice Answers:

#1	#2	#3	#4
☐	☐	☐	☐

Multiple Choice Questions (1-4)

Question 1. *Find the interval(s) on which the following function is decreasing:*

$$f(x) = \frac{2}{x^2} - \frac{x}{2} - 4$$

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

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

A) $\ln 4 - 2$ **B)** $2 \ln 2 - \frac{4}{3}$ **C)** $\ln 2 + \frac{1}{3}$
D) $2e^2 - \frac{4}{3}$ **E)** $\ln 2 + 2e$ **F)** $2 \ln 2 - \frac{8}{3}$

Question 3. *Suppose that the demand function for a product is given by* $p = 18 - 4\sqrt{x}$. *What is the elasticity of demand when* $x = 4$*? Is demand elastic or inelastic?*

A) $\eta = -\frac{2}{5}$, inelastic **B)** $\eta = -\frac{5}{2}$, inelastic **C)** $\eta = -\frac{5}{2}$, elastic
D) $\eta = -\frac{11}{5}$, inelastic **E)** $\eta = -1$, unit elastic **F)** $\eta = -\frac{11}{5}$, elastic

Question 4. *Calculate the following definite integral.*

$$\int_1^4 \left(\frac{2}{\sqrt{x}} + e^{x-1} \right) dx$$

A) $\frac{2}{3}e^3$

B) $e^3 + 3$

C) $e^4 + 2\sqrt{2}$

D) $\frac{2\sqrt{2}-2}{3} + e^3$

E) $\frac{2}{e^3} + 3$

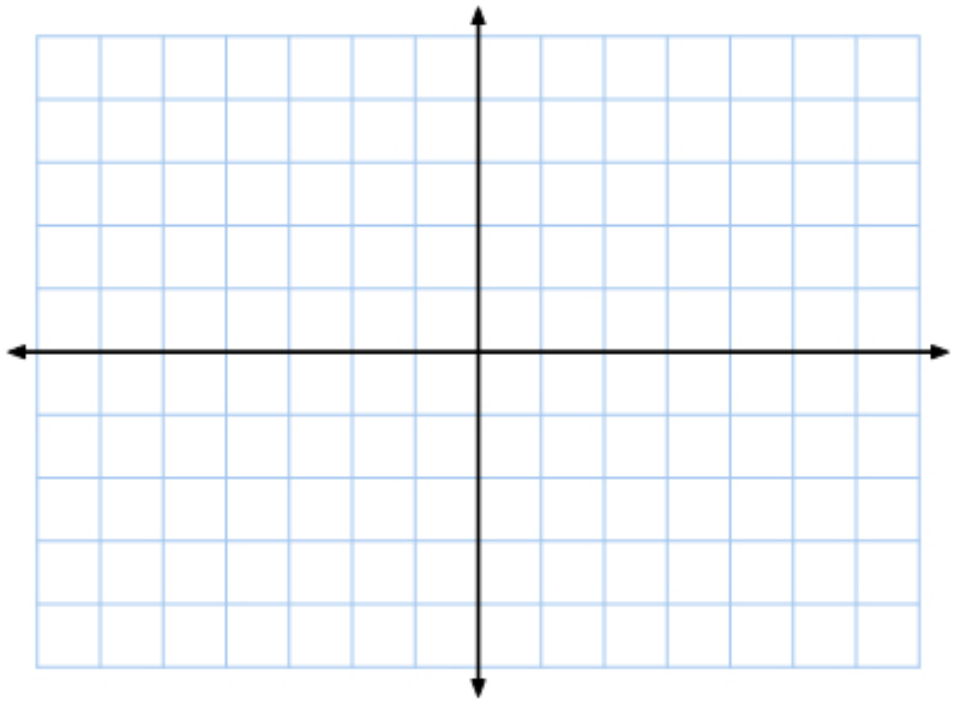
F) $\frac{1}{e^3} + 5$

Long Answer Section Questions (5-7)

Question 5. (14 points) *For the following function find the appropriate information (listed next page) to sketch the graph of the following function.*

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

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) *Use the second derivative test to find and classify the critical points for the following function. Don't forget to find the Y-coordinate of the local extremas.*

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

Question 7. (8 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 (i.e. for a group of 37 people the fare is \$59.5, etc) . 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? (Assume the number of people in each group is at least 36)*

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

Space for additional work