MATH 1300-MIDTERM # 2-2010

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.

TURN OFF YOUR CELL PHONES AND

PUT THEM AWAY.

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

ANSWERS:

☐	☐	☐	☐
#1	#2	#3	#4

Multiple Choice Section Questions (1-4)

Question 1 *Find* $f'(\ln(2))$ *when* $f(x) = xe^{3x}$

A) $8 + 24\ln(2)$ **B)** $8 + 3\ln(2)$ **C)** $24 + 3\ln(2)$ **D)** $1 + 2\ln(2)$ **E)** $-3\ln(2)$

Question 2 *Suppose that the demand function for a product is given by* $p = -x^2 - 2x + 20$. *What is the elasticity of demand when* $x = 3$*? Is demand elastic or inelastic?*

A) $\eta = -\frac{1}{5}$, elastic **B)** $\eta = -\frac{1}{5}$, inelastic **C)** $\eta = -\frac{5}{24}$, elastic

D) $\eta = -\frac{5}{24}$, inelastic **E)** $\eta = -\frac{6}{11}$, elastic

Question 3 *Given the function* $f(x) = \frac{1}{x^2+1}$*, which of the following statements is correct? (Only one is correct.)*

A) $f(x)$ has a local minimum at $x = -2$
B) $f(x)$ has a local maximum at $x = -2$
C) $f(x)$ has an inflection point at $x = -2$
D) $f(x)$ has a local maximum at $x = 0$
E) $f(x)$ has a local minimum at $x = 0$

Question 4 *Consider the function* $g(x) = x^4 + 2x^3 - 12x^2 - 6x + 2$*. On what interval or intervals is the function concave down?*

A) $(-3, 2)$ **B)** $(2, \infty)$ **C)** $(-2, 1)$ **D)** $(-\infty, -2)$ **E)** $(0, 1)$

Long Answer Section Questions (5-7)

Question 5 (14 points) *A population of zombies is growing exponentially. In 1999, there were 12,000 zombies, and in 2005 there were 15,000 zombies.*

(a) *(4 points) Find a formula which describes the size of the zombie population as a function of time (measured in years).*

(b) *(4 points) What will the population size be in 2024?*

(c) *(6 points) How many years will it take before there are 22,000 zombies on the island?*

Question 6 (14 points)

A car is 40 miles east of an intersection and is travelling east away from the intersection at a rate of 20 miles per hour. Another car is 30 miles north of the intersection and is travelling north away from the intersection at a rate of 50 miles per hour. At what rate is the distance between them changing? **Be sure to draw a picture to help with your answer.**

Question 7 (14 points) *If a tour company charges 80 dollars per person for its tour, they get 300 customers. For each 5 dollar decrease in price, an additional 30 customers are attracted. At what price will the company maximize revenue?* **Be sure to explain why your answer is an absolute maximum.**

Bonus Question (a half point): Name the film star whose first starring role was in the 1958 film *The Blob*.

Space for additional work