

# MATH 1300A-MIDTERM # 1-2011.

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** For what values of  $x$  is the following function continuous?

$$f(x) = \begin{cases} x - 2 & \text{if } x < -1 \\ x^2 - 2x + 1 & \text{if } -1 \leq x \leq 2 \\ 3 - x & \text{if } x > 2 \end{cases}$$

- A)** all real numbers      **B)** all real numbers, except -1      **C)** all real numbers, except 2  
**D)** all real numbers, except -1 and 2      **E)** all real numbers, except -1, 2 and 0.

**Question 2** Find the equation of the tangent line of the function

$$f(x) = x\sqrt{2x + 5} \text{ at } x = 2.$$

- A)**  $y = \frac{13}{3}x - \frac{8}{3}$       **B)**  $y = \frac{11}{3}x - \frac{4}{3}$       **C)**  $y = \frac{17}{3}x - \frac{2}{3}$       **D)**  $y = \frac{13}{3}x + \frac{7}{3}$   
**E)**  $y = \frac{11}{3}x + \frac{2}{3}$

**Question 3** Assuming that a bank is paying 5% annual interest which is compounded continuously, find the time needed for an initial deposit of 5,000 dollars to triple.

- A)  $20 \ln(2)$  years      B)  $10 \ln(2)$  years      C)  $20 \ln(3)$  years      D)  $10 \ln(3)$  years
- E)  $16 \ln(4)$  years

**Question 4** Find the following limit. (Note: This is a one-sided limit.)

$$\lim_{x \rightarrow 4^+} \frac{|x - 4|}{x - 4}.$$

- A) 1      B) -1      C) 0      D)  $\infty$       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*

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

**Solution**

**Question 6 (12 points)** *When the price of a brand of golf ball is 10 dollars per golf ball, 32,000 golf balls are sold. When the price is raised to 13 dollars, 26,000 golf balls are sold. A golf ball costs 4 dollars to make, and the owners of the golf ball company had an initial cost of 22,000 dollars.*

- *Find the demand function for this brand of golf ball. You may assume the demand is linear.*
- *Find the revenue and cost functions for this brand of golf ball.*
- *Find the profit function for this brand of golf ball.*

**Solution**

**Question 7 (14 points)**

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

$$x^2 + 2y^2 = 3xy$$

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

**Solution**

Space for additional work