

# MATH 141

Midterm 1

February 18, 2005

NAME (please print legibly): \_\_\_\_\_

Your University ID Number: \_\_\_\_\_

- No calculators are allowed on this exam.
- Please show all your work. You may use back pages if necessary. You may not receive full credit for a correct answer if there is no work shown.
- Present your work using proper mathematical notation.

QUESTION	VALUE	SCORE
1	15	
2	15	
3	10	
4	20	
5	20	
6	20	
TOTAL	100	

1. (15 pts) Sketch the graph of the functions below. Include at least one **labeled point on the graph** of each function.

(a)  $f(x) = 1 - (x + 2)^2$

(b)  $g(x) = 3 \cos(2x)$  [Label at least two points on the graph of  $g(x)$  and label the range.]

(c)  $h(x) = e^{-x} + 2$

2. (15 pts) (a) Find the inverse of the function  $f(x) = 2 \ln(3x + 2)$

(b) Determine the interval(s) over which the function  $f(x)$  is continuous.

ANSWER: \_\_\_\_\_

3. (10 pts) Solve for  $x$ .

$$3^{2x+1} = 9^{3x+5}$$

ANSWER: \_\_\_\_\_

4. (20 pts) Consider the function  $f(x)$  whose graph is given below:

Calculate the following limits and fill the the blanks:

(a)  $\lim_{x \rightarrow 0^+} f(x) =$

(f)  $\lim_{x \rightarrow 3} f(f(x)) =$

(b)  $\lim_{x \rightarrow \infty} f(x) =$

(g)  $\lim_{x \rightarrow -2^-} f(x) =$

(c)  $\lim_{x \rightarrow 0} f(x) =$

(h)  $\lim_{x \rightarrow 5} f(x) =$

(d) The domain of  $f(x)$  is \_\_\_\_\_.

(e)  $f(x)$  is continuous on the interval(s) \_\_\_\_\_.

ANSWER: \_\_\_\_\_

5. (20 pts) For each part below, evaluate the limit, if it exists.

(a)  $\lim_{x \rightarrow 1} \frac{3x + \sqrt{x}}{x^2 + 9}$

(b)  $\lim_{x \rightarrow 0} \frac{(4 + x)^2 - 16}{x}$

$$(c) \lim_{x \rightarrow \infty} \frac{3x^2 + 2x - 1}{28 + x - 2x^2}$$

$$(d) \lim_{x \rightarrow 3^+} \frac{4}{-x + 3}$$

6. (20 pts) Determine the value of  $c$  so that the function  $g(x)$  is continuous everywhere.

$$g(x) = \begin{cases} 7 - 2x^2 & x \geq 2 \\ 4x - c & x < 2 \end{cases}$$