GÓMEZ

Math 171
Fall 2005

C. Gómez
October 10, 2005

Exam 1

Name: _____

TA's Name _____

Section Time _____

Problem	Score
1	
2	
3	
4	
5	
6	
7	
8	
Total	

This exam contains 10 pages, and 8 problems. Before you begin, please make sure all the pages are here.

The last page of the exam contains some geometric formulas that may or may not come in handy. If you decide to tear off that page, please do so carefully.

No calculators, notes, or books are allowed.

You must show all your work, and explain your reasoning to receive credit for your answers.

Be sure to check your answers whenever possible.

Good luck!

1. [8 points] Find an equation of the line passing through the point $(-1, 2)$ and perpendicular to $6x + 3y = 15$.

2. [8 points] Find the standard equation of the circle centered at $(1, -1)$ and containing the point $(-3, 2)$.

3. [9 points] Find an equation of the parabola that has a vertical axis, vertex $(1, 4)$ and x-intercept 2.

4. Let $f(x) = \dfrac{x}{x-2}$ and $g(x) = x + 2$.

   (a) [5 points] Find and simplify $(f \circ g)(x)$, and express its domain in interval notation.

   (b) [5 points] Find and simplify $(g \circ f)(x)$, and express its domain in interval notation.

5. [12 points] Solve the inequality $\dfrac{x+1}{x+3} \leq 2$, and express your answer in interval notation.

6. Sketch the graph of each of the following functions and label any intercepts and asymptotes.

   (a) [10 points] $y = 4x^2 - x^4$

6. *(Continued)*

(b) [10 points] $y = \dfrac{x}{x+1}$

7. Let

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

(a) [12 points] Carefully sketch the graph of f.

(b) [6 points] Use your graph to determine

i. $\lim_{x \to -1^+} f(x)$

ii. $\lim_{x \to -1^-} f(x)$

iii. $\lim_{x \to -1} f(x)$

8. A stuffed animal is projected vertically upward from ground level so that its height (in feet) after t seconds is given by

$$h(t) = -16t^2 + 96t$$

(a) [5 points] How long will it take for the toy to hit the ground?

(b) [10 points] How high did it go?

Geometric Formulas

volume of a cone: $V = \frac{1}{3}\pi r^2 h$

surface area of a cone: $S = \pi r\sqrt{r^2 + h^2}$

volume of a sphere: $V = \frac{4}{3}\pi r^3$

surface area of a sphere: $S = 4\pi r^2$

volume of a right circular cylinder: $V = \pi r^2 h$

surface area of a right circular cylinder: $S = 2\pi r h$