

## Exam 1

Name: \_\_\_\_\_

TA's Name \_\_\_\_\_

Section Time \_\_\_\_\_

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!*

Problem	Score
1	
2	
3	
4	
5	
Total	

1. Solve the following equations.

(a) [10 points]  $\sqrt{7x + 2} + x = 6$

(b) [10 points]  $\frac{3x + 1}{5x + 7} = \frac{6x + 11}{10x - 3}$

2. [12 points] Find all real solutions of  $10x^2 + 11x > 6$ . Express your answer in interval notation.

3. Sketch the graphs of the following equations and label the  $x$ - and  $y$ -intercepts.

(a) [14 points]  $y = -x^2 - 2x + 3$

3. (Continued)

(b) [14 points]  $f(x) = \begin{cases} (x-1)^2 & \text{if } x < 0 \\ 3x & \text{if } 0 \leq x < 2 \\ 6 & \text{if } x \geq 2 \end{cases}$

4. Let  $f(x) = x - 2$  and  $g(x) = \frac{1}{x + 3}$ .

(a) [6 points] Find  $f \circ g$  and express its domain in interval notation.

(b) [6 points] Find  $g \circ f$  and express its domain in interval notation.

(c) [12 points] Verify that  $g \circ f$  is one-to-one and find  $(g \circ f)^{-1}$ .

5. In an effort to help slow down tuition hikes, the University of Wisconsin has decided to fence off a beach on Lake Mendota so they can charge admission. Funds have been allocated for 80 meters of fencing. The area to be enclosed will be a rectangle, but only three sides will require fencing—the fourth side of the rectangle will be the lake shore.

(a) [8 points] Express the area of this rectangular beach as a function of the length of one of its sides.

(b) [8 points] Using only the methods covered so far in this course, find the maximum area that can be enclosed in this way.