University of Georgia   **Math 1113**

Department of Mathematics   **Test 1**   Fall 2017

By providing my signature below I acknowledge that I abide by the University's academic honesty policy. This is my work, and I did not get any help from anyone else:

Name (sign): _____

Name (print): _____

Student Number: _____

Instructor's Name: _____

Class Time: _____

Problem Number	Points Possible	Points Made
1	15	
2	15	
3	10	
4	5	
5	15	
6	20	
7	10	
8	10	
Total:	100	

- If you need extra space use the last page.

- Please show your work. **An unjustified answer may receive little or no credit.**

- If you make use of a theorem to justify a conclusion then state the theorem used by name.

- Your work must be **neat**. If I can't read it (or can't find it), I can't grade it.

- The total number of possible points that is assigned for each problem is shown here. The number of points for each subproblem is shown within the exam.

- Please turn off your mobile phone.

- A calculator is not necessary, but numerical answers should be given in a form that can be directly entered into a calculator.

1. Determine the values of x that satisfies each equation below. Print your answer in the box provided, and your answer should be an exact answer. (No decimal approximations.)
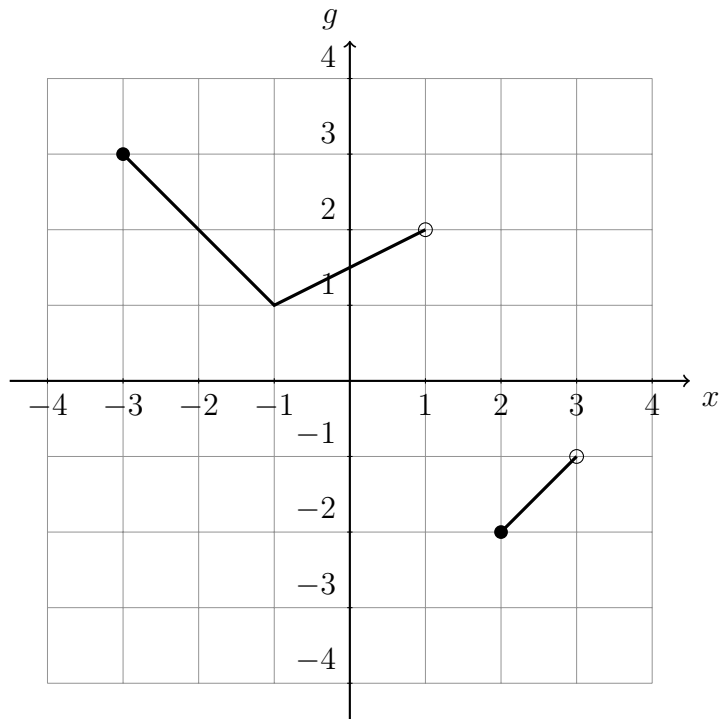
———   (a) [5 pts] $\dfrac{1}{x} - 1 = 2$.

$x =$

———   (b) [5 pts] $\sqrt{3x - 1} = 4$.

$x =$

out of a possible 10 points

(c) [5 pts] $\sqrt{8x+1} = x + 1$.

$x =$

Points earned: _____
out of a possible 5 points

2. The graph of a function, $g(x)$, is given in the plot below. Use the graph to answer the questions below.

_____ (a) [5 pts] Determine the domain of the function.

(b) [5 pts] Determine the range of the function.

_____

(c) [5 pts] Determine a formula for the function. (Use proper notation.)

_____

Points earned: _____
out of a possible 15 points

3. Two functions are defined,

$$f(x) = x^2 - 1,$$
$$g(x) = \sqrt{2x + 1}.$$

Use the definitions to answer the questions below.

  (a) [5 pts] Determine the value of $f(g(4))$.

$f(g(4))$:

  (b) [5 pts] Determine the value of $g(f(4))$.

$f(g(4))$:

4. [5 pts] The function W is define to be

$$W(x) = \sqrt[3]{4 - x^2}.$$

Determine two functions, u and v, so that

$$W(x) = u \circ v(x).$$

5. [15 pts] The energy costs for a building have a constant rate of increase of 80$ per hour from 8:00am ($t = 0$ hours) to 6:00pm ($t = 10$ hours). From 6:00pm to midnight the energy costs increase at a constant rate of 45$ per hour. The cost at 8:00am is estimated to be 300$. Determine the energy costs for the building at any time between 8:00am and midnight.

6. For each relationship below determine if the relationship is a function. (Briefly explain your reasoning.) Also, determine the x and y intercepts of the relationships.
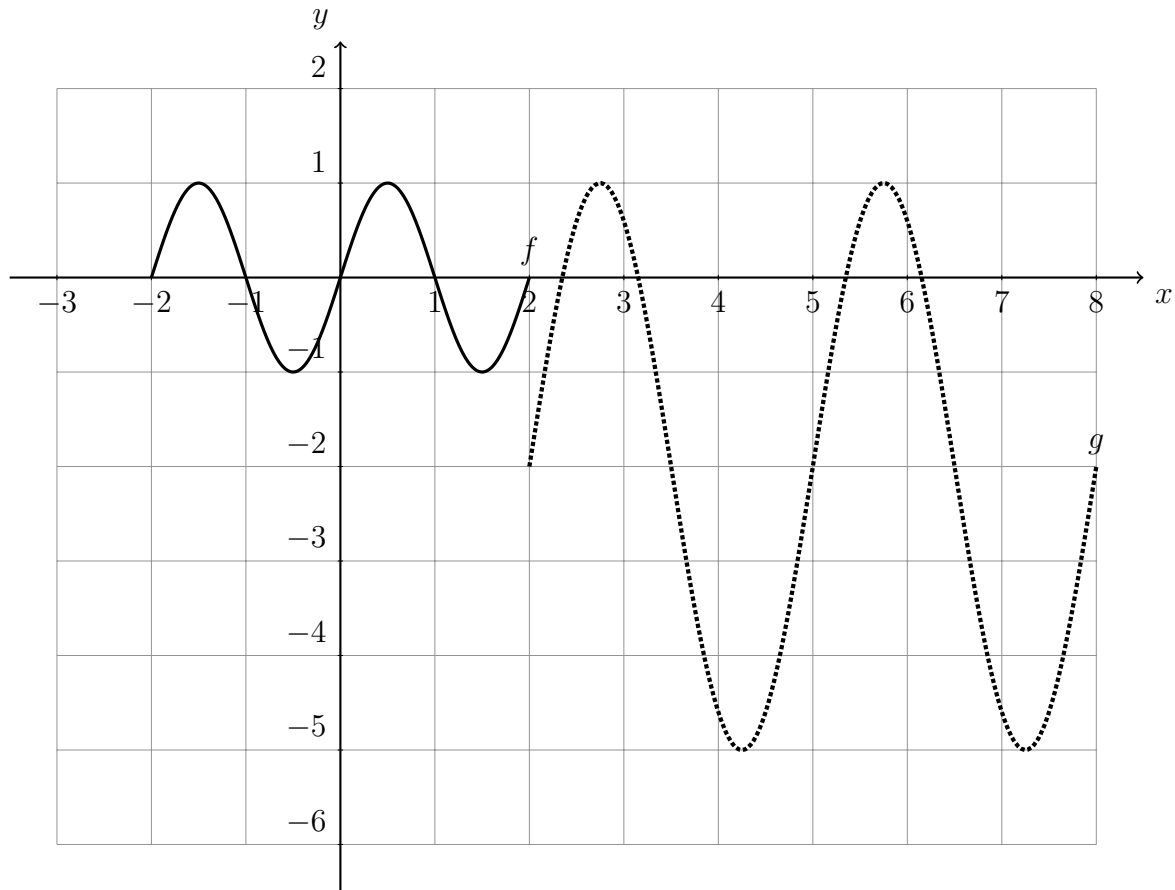
_____

(a) [10 pts]

_____ (b) [10 pts] $y = \sqrt{x + 2}$.

Points earned: _____
out of a possible 20 points
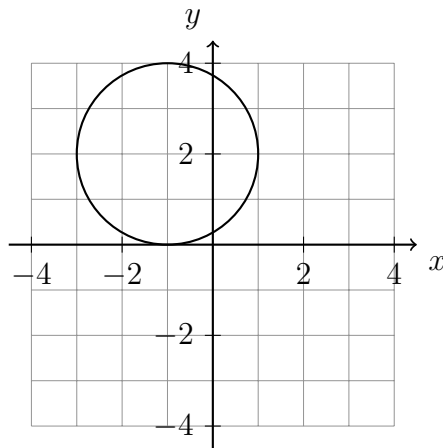
7. [10 pts] The graph of a function, f, is shown in the figure below with a solid line. The function g is shown with a dotted line. Determine the values for all of the constants, A, b, c, and d so that

$$g(x) \;=\; A \cdot f(b \cdot x + c) + d.$$

A	=
b	=
c	=
d	=

8. [10 pts] A process in a factory will make use of a large tank. For each gallon (x) the tank can hold, the plant will produce y items. The production costs of the factory will be 3,000\$ for each gallon the tank can hold plus 2,000\$ for each item. A total of 50,000\$ is allocated for the production costs. What values for x and y will maximize the total number of items produced?

Points earned: _____
out of a possible 10 points

Extra space for work. **Do not detach this page.** If you want us to consider the work on this page you should print your name, instructor and class meeting time below.

Name (print): _____ Instructor (print): _____ Time: _____