

Autumn 2016

Name (Print): \_\_\_\_\_

Form A

Signature: \_\_\_\_\_

OSU name.#: \_\_\_\_\_

Lecturer: \_\_\_\_\_

Recitation Instructor: \_\_\_\_\_

Recitation Time: \_\_\_\_\_

## Math 1148: Midterm Exam 1

### Instructions:

- Show ALL work to receive full credit. Answers with insufficient supporting work will receive little or no credit.
- Please CIRCLE your answers
- If you find the solution to a problem using a graph from your calculator (*where appropriate*), you need to sketch that graph and label all relevant information.
- The exam consists of 11 problems starting on page 2 and ending on page 6. Make sure your exam is not missing any pages before you start.

Page	2	3	4	5	6	Total
Maximum Points	25	15	20	18	22	100
Student Score						

1. Solve the following absolute value inequality:  $|2x - 3| - 7 < 5$  (8 points)

2. Determine the domains of the following functions. (3 points each)

Functions	Domains (use interval notation)
$f(x) = \frac{x^2 - 7}{x - 3}$	
$g(x) = \frac{x - 7}{x^2 - 9}$	
$h(x) = \frac{\sqrt{x + 3}}{x - 7}$	

3. Write an equation for a line which passes through the point (3,5) and is perpendicular to the line  $4x + 7y = 17$ . (8 points)

4. The temperature of a hot cup of coffee as it cools on a counter can be modelled by the following function where 't' is minutes that it has been cooling and 'T' is temperature in degrees Fahrenheit.

$$T(t) = 72 + 120(1.065)^{-t}$$

Use this function to find the average rate at which the coffee is cooling from  $t = 3$  minutes to  $t = 10$  minutes. ( 5 points)

5. A small business makes cupcakes and sells them at the local market each week. There is a fixed weekly cost to sell at the market of \$325. The total of all costs involved in making the cupcakes amounts to \$0.43 per cupcake. You plan to sell each box of 8 cupcakes for \$5.00.
- Write a linear revenue function  $P(x)$  for the total profit of your business if you sell 'x' boxes of cupcakes in a given week. ( 6 points)
  
  
  
  
  
  
  
  
  
  
  - How many boxes do you need to sell in order to earn a profit of \$500. (Round up to the nearest box)? (4 points)

6. Suppose that a chemist needs to have 25 liters of a salt water solution that is 14% salt. She needs to combine some 8% salt solution with some 20% salt solution. How many liters of each solution should she mix together? (10 points)

7. Suppose you sell tickets for the county fair, children cost \$3.00 each, adults cost \$7.00 each and seniors cost \$5.00. There were half as many seniors as adults and there were 1200 total tickets sold. How many adult tickets did you sell if the total revenue from tickets was \$6800?
- a. Set up a system of three equations to model this problem. (4 points)

- b. Solve the system showing your work. (6 points)

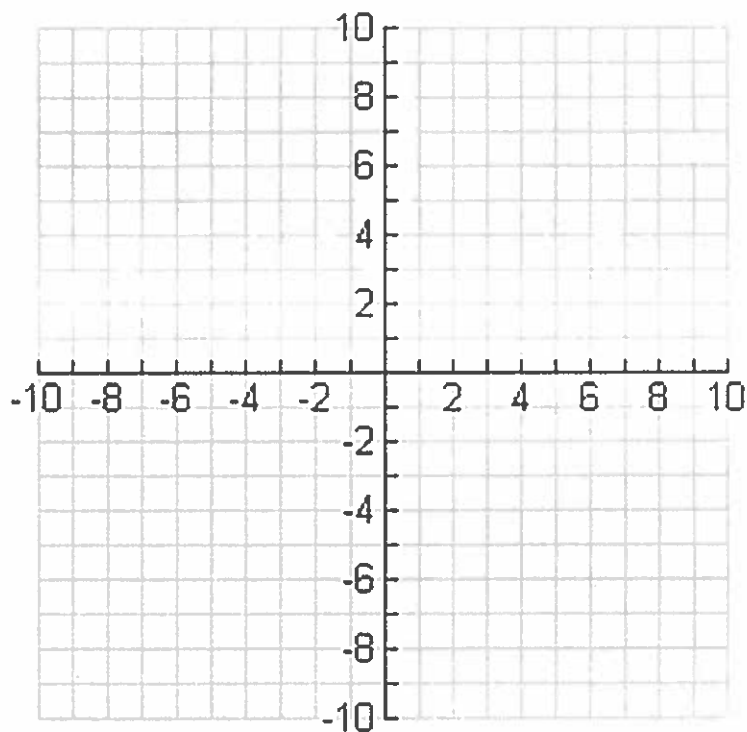
8. Starting with the basic function  $f(x) = \sqrt{x}$ , the function  $g(x)$  is obtained by applying the following transformations to  $f(x)$ .

First, shift the graph 5 units to the left. Then reflect the graph over the x-axis,

Stretch the graph vertically by a factor of 2, Finally, shift the graph up by 3 units.

- a. Find the formula for  $g(x)$  (4 points)

- b. Sketch the graph of  $y = g(x)$ . Plot and label at least two points on the transformed graph. (6 points)



9. For each equation below, determine whether or not  $y$  is a function of  $x$ . Circle the ones that are. (2 points each)

- a.  $x^3 + 3y^2 = 7$   
b.  $x^2 + 3y^3 = 7$   
c.  $x + 3|y| = 7$   
d.  $|x + 3y| = 7$

10. For the function below, answer the following:  
(3 points each)

Use interval notation to write the intervals over which  $f(x)$  is

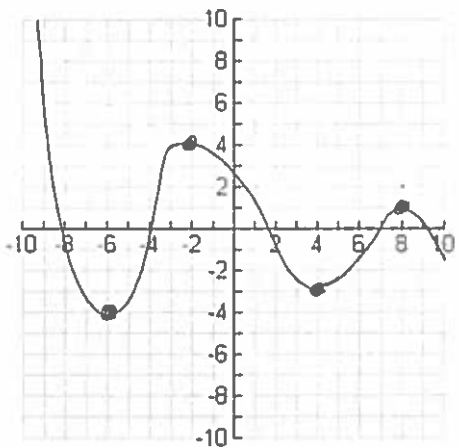
Increasing –

Decreasing –

Also identify the location and value of any

Relative Maxima -

Relative Minima -



11. The piece-wise defined function  $P(x)$  is given by:

$$P(x) = \begin{cases} x + 5 & \text{if } x \leq -3 \\ x^2 - 9 & \text{if } -3 < x \leq 1 \\ 4 & \text{if } x > 1 \end{cases}$$

a) Find the following:

(4 points)

$P(-6) =$

$P(-2) =$

$P(1) =$

$P(7) =$

b) Plot and label your points from part a) and then sketch the graph of  $y = P(x)$ .

(6 points)

