

READ THESE DIRECTIONS BEFORE STARTING

- ❖ Write your name below on the space provided.
- ❖ This test has a total of 5 pages.
- ❖ Work the problem in the space provided. If you need more space, write on the back of the test.
- ❖ To insure maximum credit, show your work. In general, full credit will not be given for unsupported answers.
- ❖ Look only at your test. Don't give the impression that you are cheating.
- ❖ Be sure to write neatly and in pencil. If I cannot read what was written, do not expect the problem to be graded.
- ❖ If you finish early, go over the test again.

Good luck!

Number	Maximum	Score
1	4	
2	12	
3	5	
4	9	
5	12	
6	4	
7	6	
8	9	
9	3	
10	3	
11	8	
12	8	
13	9	
14	8	
Total	100	

Name \_\_\_\_\_

Circle final answers

1) (4 points) Find the equation of a circle in standard form where the points  $(-2,1)$  and  $(10,6)$  are endpoints of a diameter of the circle:

2) (4 points each) Find the domain of the following functions:

a)  $f(x) = 3x^3 + 8x - 10$

b)  $g(x) = \frac{5x^2+8x+4}{x^2+6x+5}$

c)  $h(x) = \frac{4x+1}{\sqrt{5x-7}}$

3) (5 points) The number of copies,  $G$  in thousands, sold of the game *Stardew Valley Crossing* can be modeled by the function  $G(x) = -2.4x^2 + 86x + 190$  where  $x$  is the number of days after the games released. Find and interpret the average rate of change from the 5<sup>th</sup> to the 10<sup>th</sup> day after the game was released.

4) (3 points each) Cristiano, owner of the coffee house Il Picchio in Rome, started to track the number of customers he received after he started a new sales campaign on June 1st. The number of customers per date is shown in the table below.

Date	June 1	June 2	June 3	June 4	June 5	June 6	June 7
Number of Customers	538	563	580	602	640	656	698

Let  $x$  be the number of days since June 1st and let  $y$  be the number of customers.

a) Using the LinReg function on your calculator, find the equation of the regression line. Round values to two decimal places:

b) Interpret the slope and  $y$ -intercept using the language of the problem. In your interpretation, you can round values to the nearest whole number and use the word “about”:

c) Assuming this trend continues, the number of expected customers on June 12<sup>th</sup>:

5) (2 points each) For the given graph, find the following. Write parts  $a - d$  in interval notation. For parts  $c$  and  $d$ , write in terms of  $x$ . For parts  $e$  and  $f$ , write answer as an ordered pair.

a) The Domain

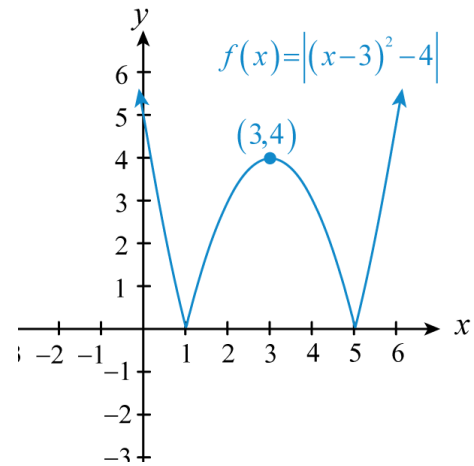
b) The Range

c) Increases

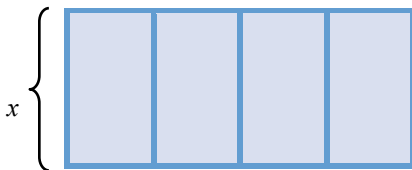
d) Decreases

e) Relative Maximum(s)

f) Relative Minimum(s)



6) (4 points) Inspired by the game *Stardew Valley Crossing*, Mike decides to take up farming. He plans to build 4 adjacent, rectangular pens enclosed on all sides. He has 400 feet of fencing available. Determine a function that will relate the area of the enclosure to the width.



7) (6 points) For the function  $f(x) = 2x^2 + 5x + 1$ , find and simplify  $\frac{f(x+h) - f(x)}{h}$ :

8) (3 points each) For the functions  $f(x) = x^2 + 2x$  and  $g(x) = \sqrt{5x - 1}$ , find and simplify...

a)  $(f - g)(x)$

b)  $(f \circ g)(x)$

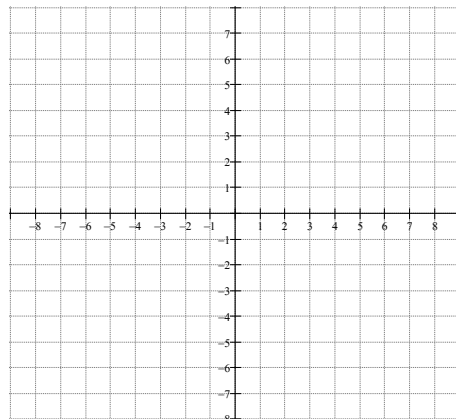
c) The domain of  $f \circ g$

9) (3 points) Find two non-identity functions  $f$  and  $g$  such that  $H = f \circ g$  where  $H(x) = \frac{2}{4x-1} + 5$ .

10) (3 points) Determine if the function  $f(x) = \frac{5x^2 + 8}{|x|}$  is even, odd, or neither algebraically.

11) (4 points each) For the function  $f(x) = -\sqrt{x+4} - 3$ ...

- a) Explain, in order, the transformations needed to sketch the graph:  
b) Sketch the graph without a calculator:



12) (2 points each) Given the point (4,5) on the graph of  $y = f(x)$ , find the **exact value** of the coordinates of the point under the transformation below:

- a)  $y = f(x) + 6$       b)  $y = f(x - 4)$       c)  $y = -f(x) + 2$       d)  $y = 2f(x - 1) - 1$

13) (1 point each) Match the following functions the best picture:

\_\_\_\_\_ Cube root

\_\_\_\_\_ Linear

\_\_\_\_\_ Identity

\_\_\_\_\_ Square

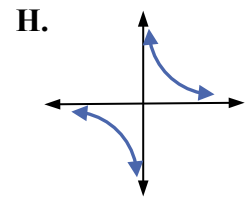
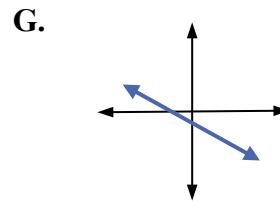
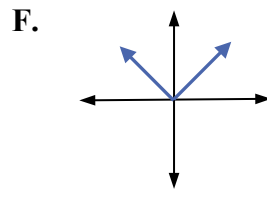
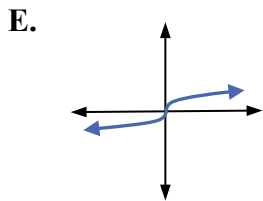
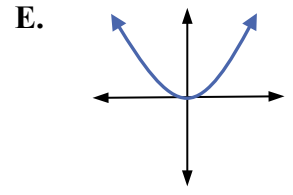
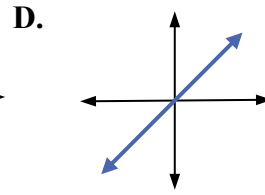
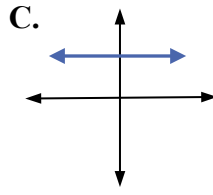
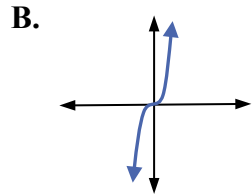
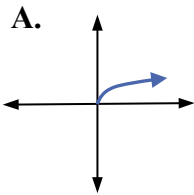
\_\_\_\_\_ Constant

\_\_\_\_\_ Square root

\_\_\_\_\_ Reciprocal

\_\_\_\_\_ Cube

\_\_\_\_\_ Absolute value



14) (2 points each) Short answer:

a) What makes a relation a function?

b) Explain why the Vertical Line Test determines if a graph is that of a function.

c) Fill in the blank: The change of the  $y$ -values per the change of the  $x$ -value of a linear function is called the \_\_\_\_\_.

d) Fill in the blank: The slope of the secant line between two points of a non-linear function is called the \_\_\_\_\_.