

READ THESE DIRECTIONS BEFORE STARTING

- ❖ Write your name below on the space provided.
- ❖ This test has a total of 6 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	6	
3	4	
4	9	
5	5	
6	12	
7	12	
8	6	
9	6	
10	3	
11	6	
12	4	
13	6	
14	8	
15	9	
Total	100	

Name \_\_\_\_\_

Circle final answers

1) (2 points each) Short answer:

a) What is a function?

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

2) (2 points each) For the given points  $(5, -2)$  and  $(0, 10)$ , find...

a) The distance between them:

b) Their midpoint:

c) Find the equation of the circle where  $(5, -2)$  and  $(0, 10)$  are endpoints of a diameter of the circle:

3) A person is remodeling the front entrance to his home and needs to cut an arch for the top of an entranceway. The arch needs to be 18 feet wide and 3 ft high. To draw the arch, he will use a stretched string with chalk attached at an end as a compass. How long of string is needed to complete the task?

4) (3 points each) Find the domain of the following functions:

a)  $f(x) = 6x^3 + 6x^2 - 4x - 4$

b)  $g(x) = \frac{x^2 + 9}{x^2 - 9}$

c)  $h(x) = \frac{-12}{\sqrt{3x-1}}$

5) (5 points) The number of copies,  $G$  in thousands, sold of the game *Persona 5 Golden* 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 6<sup>th</sup> to the 11<sup>th</sup> day after the game was released.

6) (3 points each) Consider the following data (source: Census.gov):

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Population of Cleveland, Ohio (in thousands)	434	396	393	392	392	391	389	387	386

Let  $x$  be the number of years since 2000 and let  $y$  be the population of Cleveland, Ohio (in thousands).

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:

c) Predict the population of Cleveland in 2020:

d) During what year will there be 250,000 people in Cleveland?



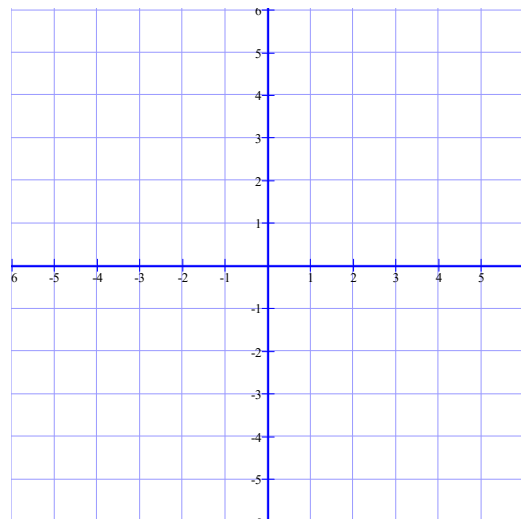
11) (6 points) For the function  $f(x) = -2x^2 - 6x + 5$ , find and simplify  $\frac{f(x+h) - f(x)}{h}$ :

12) (4 points) Determine if the function  $f(x) = \frac{|x| - 2}{x^2}$  is even, odd, or neither algebraically:

13) (3 points each) For the function  $f(x) = \frac{1}{x-3} + 2 \dots$

a) List the steps needed to sketch a graph:

b) Sketch a graph. Be sure to label the asymptotes.



14) (2 points each) Given the point  $(12, 4)$  on the graph of  $y = f(x)$ , find the **exact value** of the coordinates of the point under the transformation below:

- a)  $y = f(x) + 7$       b)  $y = f(x + 1)$       c)  $y = 3f(x) - 2$       d)  $y = -2f(x + 1) + 3$

15) (1 point each) Match the following functions with the best description or picture:

\_\_\_ Constant

\_\_\_ Linear

\_\_\_ Identity

\_\_\_ Cube

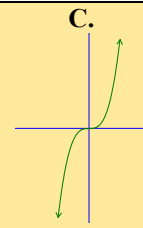
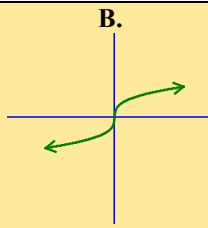
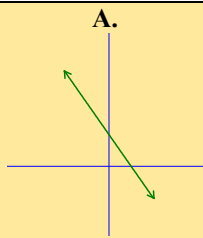
\_\_\_ Square

\_\_\_ Square root

\_\_\_ Cube root

\_\_\_ Reciprocal

\_\_\_ Absolute value



**D.**  
*The domain and range do not include zero*

**H.**  
*The graph is called a "parabola"*

**E.**  
*The range is one number*

**I.**  
*The graph is half of a parabola*

**F.**  
*The graph is V-shaped*

**J.**  
*Bisects the first and third quadrant*