

<u>Problem</u>	<u>Possible</u>	<u>Earned</u>
<b>Part I</b>		
1	6	
2	6	
3	6	
4	6	
5	6	
6	6	
7	6	
8	6	
9	6	
10	6	
<b>Part II</b>		
11	10	
12	10	
13	10	
14	10	
15	10	
16	10	
17	10	
18	10	
19	10	
20	10	
<b>Part III</b>		
21	10	
22	10	
23	10	
24	10	
25	10	
26	10	
<b>TOTAL POINTS</b>		<b>200</b>

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

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

Section: \_\_\_\_\_

Please check to make sure that your copy of the examination has 13 pages and a cover sheet with Problems 1-26.

Work in a neat and well-organized manner. Show your work on all problems. Indicate your answers clearly.

The use of calculators, books, notes or other resource materials will not be permitted on the final examination.

All cell phones and electronic devices are PROHIBITED during the final exam.

# 108/106

Name \_\_\_\_\_

NO CALCULATORS OR CELL PHONES ALLOWED.

- **You must show ALL work on this paper to receive credit.**  
**If you use scratch paper, you MUST transfer your work to this test.**
  
- **All cell phones must be stored in a bag.**  
**If you are caught with a cell phone, you will receive a 0 for the test.**

**Part I. Answer all problems in this section. Little partial credit will be given.**

**[6 points each]**

1. Solve for  $x$  and write your solution in interval notation.

$$-3 \leq \frac{5-x}{2} < 4$$

Solution: \_\_\_\_\_

2. State the center and radius of the circle with equation:  $(x - 1)^2 + (y + 3)^2 = 4$

Center: \_\_\_\_\_

Radius: \_\_\_\_\_

3. The point  $(-16, 9)$  is on the graph of  $f(x)$ . Find the corresponding point:

a. Symmetric to the origin: \_\_\_\_\_

b. On the graph of  $y = g(x)$ , where  $g(x) = f(x) - 6$ . \_\_\_\_\_

4. Let  $f(x) = x^2 - 7$  and  $g(x) = 2x + 1$ . Find and simplify:

a.  $(f - g)\left(-\frac{1}{2}\right)$

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

5. Simplify the following to  $a + bi$  form.

a.  $(2 - 4i)^2$

b.  $(-3i)^3$

6. Find a 3<sup>rd</sup> degree polynomial (in polynomial form) with zeros:  $-1, 2i,$  and  $-2i$ .  
Write the polynomial on the line below.

$$f(x) = \underline{\hspace{10em}}$$

7. Solve for  $x$ .

a.  $A = \frac{1}{2}xy$

b.  $8x - (5x + 8) = 13$

8. Given the piecewise function:

$$f(x) = \begin{cases} 2x - 4, & \text{for } x > -1 \\ -5, & \text{for } x \leq -1 \end{cases}$$

Fill in the table:

$x$	$f(x)$
-2	
-1	
0	

9. Solve for  $x$ . Show all work and circle your answer.

a.  $5x^2 + 6x = -2$

b.  $3x^2 + 9 = 12$

10. Solve the following system. Write your answer as an ordered pair on the line below.

$$\begin{cases} 4x - 3y = 18 \\ 2x + 7y = -8 \end{cases}$$

Solution: \_\_\_\_\_

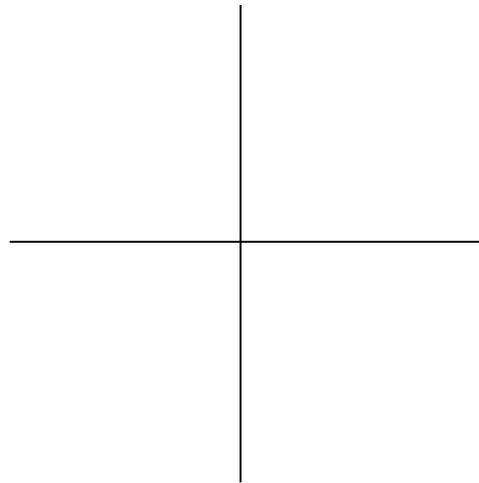
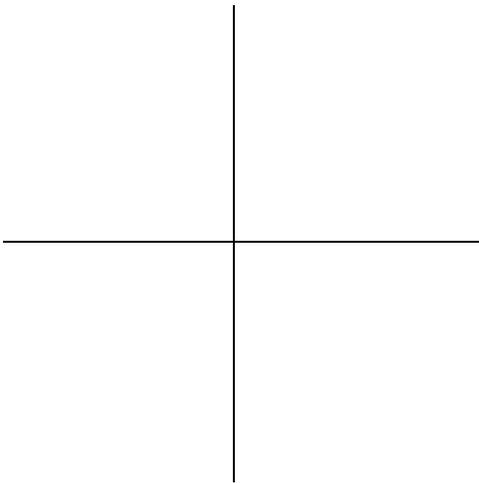
**Part II. Answer all problems in this section. [10 points each]****Partial credit will be given based on work shown.**

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**11.** Graph the following. Label at least 3 points on each of the graphs.

a.  $y = 3x - 2$

b.  $y = |x - 2|$

**12.** State the slope and  $y$ -intercept of the line which passes through the points  $(-1, 5)$  &  $(2, -7)$ .

Slope: \_\_\_\_\_

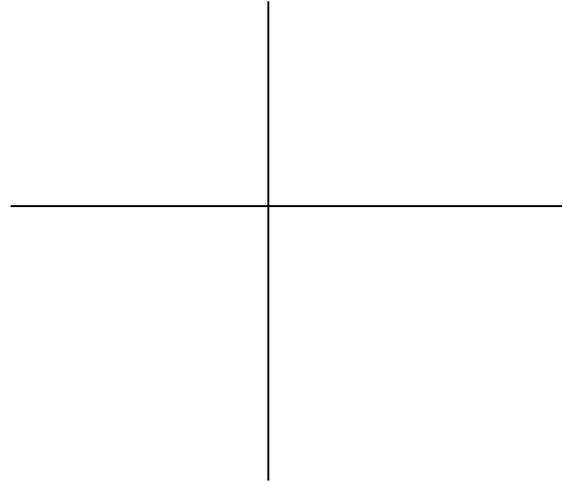
 $y$ -intercept: \_\_\_\_\_Write the equation of the line in standard form ( $Ax + By = C$ ) on the line below.

\_\_\_\_\_

13. Given  $f(x) = x(x + 2)(x - 3)^2$ , find the following and sketch the graph. Be sure to label all intercepts.

- y-intercept:

Zero	Multiplicity	Tangent or Crosses Thru



- End Behavior:

14. Given a function  $f(x)$ , find the inverse function  $f^{-1}(x)$ . Show all work and circle your answer.

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

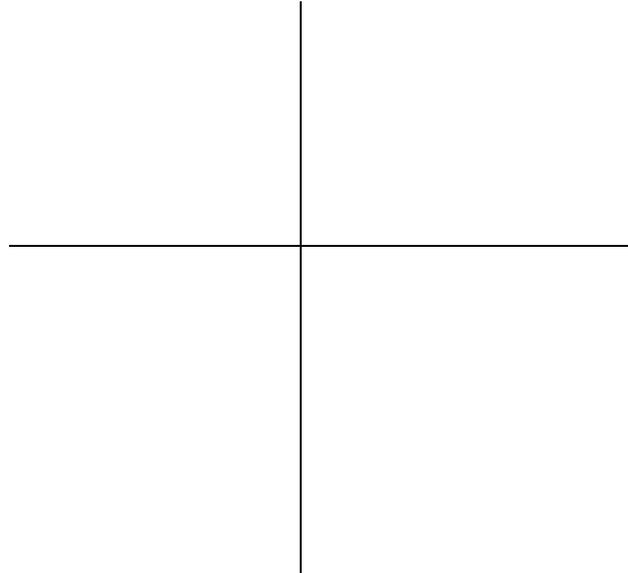
b.  $f(x) = 5x^3 - 8$

15. Find the following and sketch the graph of  $f(x) = \frac{x + 1}{x^2 - 4}$ . Be sure to label all asymptotes and points.

Zeros:                      y-int:

HA:                          VA:

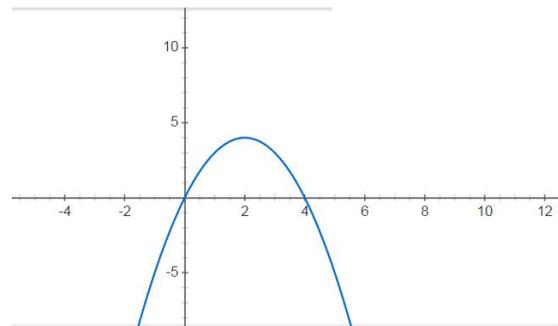
Additional Points:



16. Give the following intervals, in interval notation, for the function

$$f(x) = -(x - 2)^2 + 4, \text{ with graph shown below.}$$

Domain of $f$ :	Range of $f$ :
$f$ is increasing:	$f$ is decreasing:
$f(x) \leq 0$ :	

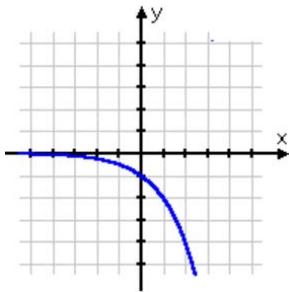


17. Solve for  $x$ . Be sure to check! Circle your answer.

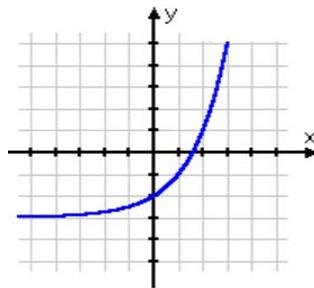
a.  $|2x - 5| + 3 = 12$

b.  $\sqrt{4x + 21} = x$

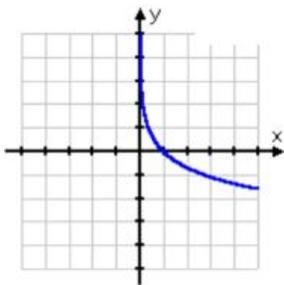
18. Write the letter of the correct equation on the line below the graph.



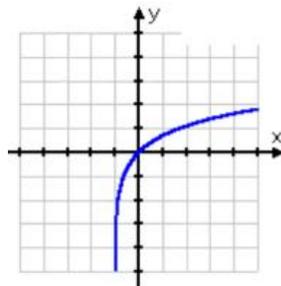
\_\_\_\_\_



\_\_\_\_\_



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\_\_\_\_\_

A.  $y = \ln(x - 1)$

B.  $y = 2^{-x}$

C.  $y = \ln(x + 1)$

D.  $y = -2^x$

E.  $y = \ln(-x)$

F.  $y = 2^x - 3$

G.  $y = -\ln x$

H.  $y = 2^x + 3$

19. Solve for  $x$ .

a.  $2 \cdot 4^x = 8^{x+3}$

b.  $6e^{x-3} - 1 = 11$

20. A stone is thrown directly upward. The height of the stone  $t$  seconds after it has been thrown is given by  $s(t) = -16t^2 + 32t + 10$  ft. Answer the following questions. Show your work algebraically and include units on your answers.

a. What is the initial height of the stone?

b. Find the time it takes the stone to reach its maximum height.

c. Find the maximum height the stone reaches.

**Part III. There are 6 problems in this section. Choose any 4.**  
**Indicate in the boxes the problems you want graded. [10 points each]**

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**21.** Given the polynomial  $f(x) = 2x^3 - 3x^2 - 4x + 5$ , find all zeros (real and complex).

Grade

a. State the possible rational zeros

b. Find at least 1 rational zero

c. Find the other zeros of  $f(x)$ .

List the zeros of  $f(x)$ : \_\_\_\_\_

**22.** Solve the following inequality. State the solution in interval notation on the line below.

Grade

$$x^5 - 9x^3 < 0$$

Solution: \_\_\_\_\_

**23.** Suppose that  $P$  is invested in a savings account in which interest,  $k$ , is compounded continuously at 2.9% per year. The balance  $P(t)$  after time  $t$ , in years, is given by the equation  $P(t) = Pe^{kt}$ .

Grade

- a. What is the exponential growth function in terms of  $P$  and  $t$ ?
  
  
  
  
  
  
  
  
  
  
- b. How long will it take for an investment of \$5,000 to double? Show your work and leave your answer in exact form.

24. Solve the system. Write the solution as an ordered triple on the line below.

Grade

$$\begin{cases} x + 2y - z = 5 \\ 2x - 4y + z = 0 \\ 3x + 2y + 2z = 3 \end{cases}$$

Solution: \_\_\_\_\_

25. Let  $f(x) = 2x^2 + x - 4$ . Set up and simplify the difference quotient:  $\frac{f(x+h)-f(x)}{h}$

Grade

26. Consider the following system:  $\begin{cases} 3x - 2y = 8 \\ y = -2x + 3 \end{cases}$



a. Solve algebraically. Show all work.

Grade

b. Solve graphically. Graph each line on the same set of axes, and show where the lines cross. Be sure to label your points and the lines.

