

NAME: \_\_\_\_\_

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

**I. SIMPLIFY THE FOLLOWING EXPRESSIONS.****Show all appropriate work!**

1.  $\frac{63m^{-2}v^3}{15m^6v^{-5}}$  (write the result using only positive exponents)

1. \_\_\_\_\_ (2)

2.  $\sqrt[5]{k^7}$  (write in exponential notation)

2. \_\_\_\_\_ (2)

3.  $(8n^6)^{\frac{2}{3}}$

3. \_\_\_\_\_ (2)

4.  $\sqrt{27x^8y^5}$

4. \_\_\_\_\_ (2)

5.  $\frac{3x^2 - 5x - 2}{x^2 - 3x + 2}$

5. \_\_\_\_\_ (2)

6.  $\frac{x^2 - 9}{6x + 15} \div \frac{x - 3}{15}$  (division)

6. \_\_\_\_\_ (3)

7.  $\frac{2x + 3}{x} - \frac{x - 2}{x + 1}$

7. \_\_\_\_\_ (3)

II. SOLVE OR ANSWER QUESTIONS.

Show all appropriate work!

8. Complete the square:  $t^2 - 9t$  \_\_\_\_\_ ? \_\_\_\_\_

8. \_\_\_\_\_ =  $\left( \frac{\text{_____}}{\text{(binomial squared)}} \right)^2$  (3)  
(completed trinomial)

9. Find the EXACT solutions:  $(y + 5)^2 = 14$

9. \_\_\_\_\_ (2)

10.  $\frac{5x + 4}{x} - \frac{x}{2} = 6$

10. \_\_\_\_\_ (4)

11.  $5k + 2 = \sqrt{5k + 4}$

11. \_\_\_\_\_ (4)

12.  $\log_2(3t + 1) = 4$

12. \_\_\_\_\_ (3)

13.  $15 \cdot (1.4)^x = 360$  (round the answer to 3 decimal places)

13. \_\_\_\_\_ (3)

14. Solve the system:

$$5x + 2y = 7$$

$$-\frac{x}{2} + \frac{y}{6} = \frac{3}{2}$$

14.  $x =$  \_\_\_\_\_ (2)

$y =$  \_\_\_\_\_ (2)

14. For the function  $f(x) = \frac{4}{x+3}$ :

a. Find  $f(5)$ .

$f(5) =$  \_\_\_\_\_ (2)

b. For what value of  $x$  is  $f(x) = -2$ ?

$x =$  \_\_\_\_\_ (3)

c. Find  $f(2t - 3)$  and simplify

$f(2t - 3) =$  \_\_\_\_\_ (3)

d. What is the domain of  $f(x)$ ?

Domain: \_\_\_\_\_ (2)

III. MISCELLANEOUS

Show all appropriate work!

15. Convert the expression  $7^{10-y} = 4k$  into a logarithm:

15. \_\_\_\_\_ (2)

16. In the list below, circle the expression equivalent to  $2\log_a X - \log_a Y$

(2)

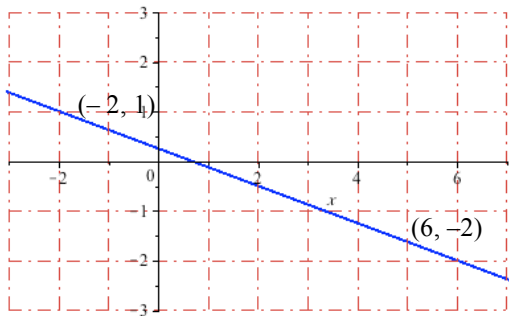
$\log_a(2X - Y)$

$\log_a\left(\frac{2X}{Y}\right)$

$\log_a\left(\frac{X^2}{Y}\right)$

$\log_2(X^2 - Y^2)$

17. Find the slope-intercept equation of the line in the graph:



17. \_\_\_\_\_ (4)

18. From the list below, identify the line(s) that are parallel and perpendicular to the line  $y = \frac{3}{5}x + 8$ . If no selection matches, use the appropriate option:

A.  $3x + 5y = 20$

Parallel: \_\_\_\_\_ (2)

B.  $10x + 6y = 11$

C.  $3x - 5y = 0$

Perpendicular: \_\_\_\_\_ (2)

D.  $5x - 3y = -7$

E. NONE

19a. Compute the discriminant ( $D = b^2 - 4ac$ ) for the equation  $-\frac{1}{6}x^2 + 3x - 9 = 0$

Discriminant: \_\_\_\_\_ (2)

19b. If a quadratic equation has the given discriminant value, how many distinct solutions does the equation have?

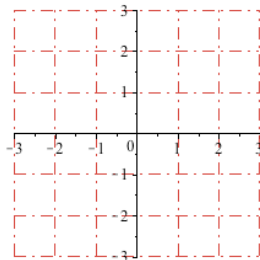
$D = -5$       Number of solutions: \_\_\_\_\_ (1)

$D = 0$       Number of solutions: \_\_\_\_\_ (1)

20. Plot the points from each of the following tables and match your plot with one of the given graphs:

a.

x	y
-0.5	1.4
0.5	2
1.5	2.3
2.5	2.5

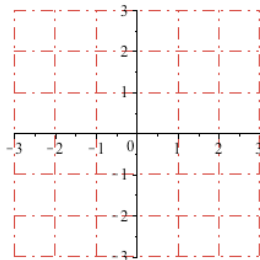


Plot (2)

Graph match: \_\_\_\_\_ (1)

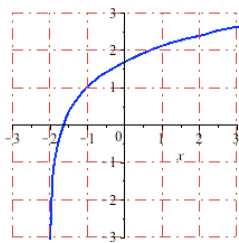
b.

x	y
-1.5	1.4
-0.5	0.5
0.25	0.26
1	0.1

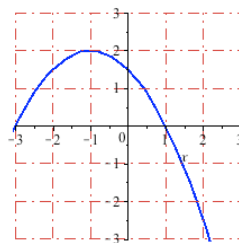


Plot (2)

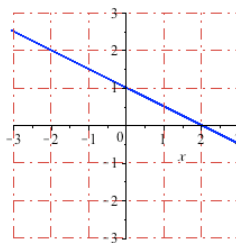
Graph match: \_\_\_\_\_ (1)



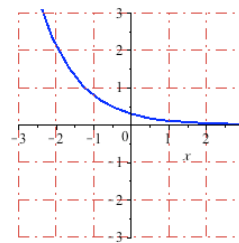
I



II



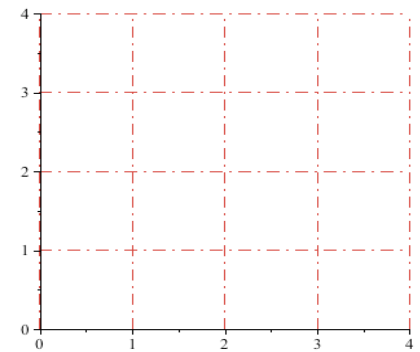
III



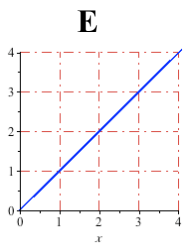
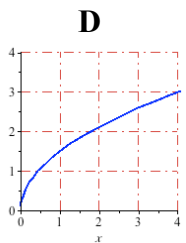
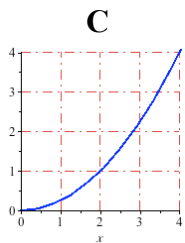
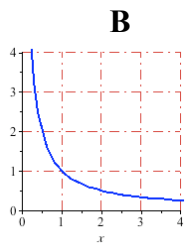
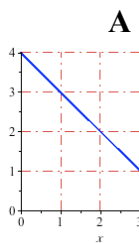
IV

21. Use your calculator to sketch a neat graph of  $f(x) = (1.3)^{x+2} - 2 \log(5x)$  in the provided coordinate grid for  $0 \leq x \leq 4$ .

Graph (4)



22. Match a graph to each description of a function, where:



*Y varies inversely with X*  
(2)

*Y varies directly with the square root of X*  
(2)

IV. APPLICATIONS.

Show all appropriate work!

23. Twelve thousand dollars is invested in two different accounts, one paying 6% interest and the other paying 4% interest. The total interest earned from both accounts is \$560. If  $A$  is the amount of money invested at 6% interest and  $B$  is the amount of money invested at 4% interest, set up the system of equations that describes this scenario and write it in the provided box. YOU DON'T NEED TO SOLVE THE SYSTEM!

System:  
(4)

24. Twelve network printers can produce a set of documents in 20 hours. How long would it take 15 printers to get the same job done? (The time is inversely proportional to the number of printers used for the job.)

Time for 15 printers: \_\_\_\_\_ (4)

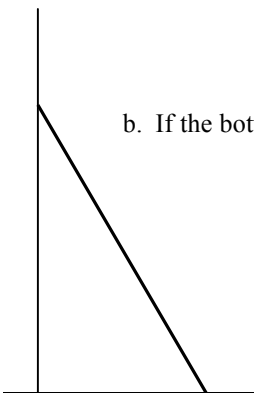
25. A 20 foot-long plank is leaned against the wall, with the bottom end resting on the ground 12 feet away from the wall.

a. How far up the wall does the top end of the plank reach?

Plank's original reach up the wall: \_\_\_\_\_ (2)  
(include units with answer)

b. If the bottom end of the plank is to be moved 2 feet further from the wall, how far would the top end of the plank move?

Movement of the plank's top end: \_\_\_\_\_ (3)  
(round to 2 decimal places and include units with answer)



26. The profit, *in hundreds of dollars*, from producing  $x$  cases of souvenir medallions is modeled by the function  $P(x) = -0.05x^2 + 4x - 20$ .

a. What is the profit from producing 10 cases of the medallions? 26a. \_\_\_\_\_ (2)  
(include units with answer)

b. How many cases lead to the maximum profit? 26b. \_\_\_\_\_ (2)  
(include units with answer)

c. What is the maximum profit? 26c. \_\_\_\_\_ (3)  
(include units with answer)

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27. The function  $R = 400,000 (1.012)^t$  models the population of a town  $t$  years *after the beginning of 2000*.

a. What is the town's population at the beginning of 2000? 27a. \_\_\_\_\_ (1)

b. What is the town's population, to the nearest thousand, at the beginning of 2012? 27b. \_\_\_\_\_ (2)

c. During what year will the population of this town reach 490,000? 27c. \_\_\_\_\_ (3)