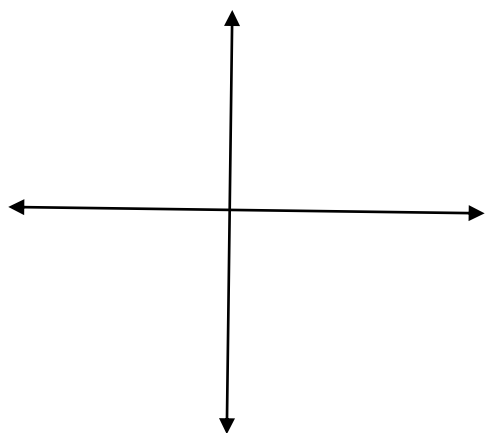


**INSTRUCTIONS:** You must show enough work to justify your answer on **ALL** problems. Correct answers with no work (or inconsistent work) shown **will not** receive full credit. **All answers are to be exact; no decimal approximations.** You are **NOT** allowed to use any electronic device for this exam.

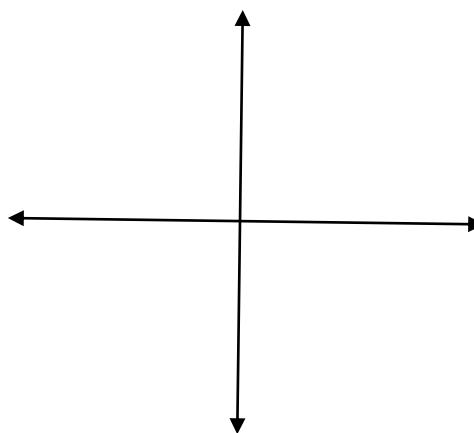
1. Sketch the graph of the following functions. Label **at most** three number(s) on the  $x$ -axis and/or  $y$ -axis to help identify your sketch. Then state the domain and range of the function in interval notation. (14 pts.)

a.  $f(x) = 5\left(\frac{2}{7}\right)^{x+4} + 3$



Domain \_\_\_\_\_ Range \_\_\_\_\_

b.  $y = -2 \ln(x - 6)$



Domain \_\_\_\_\_ Range \_\_\_\_\_

2. Use the properties of logarithms to write the following as a sum and/or difference of logarithms. All variables represent positive numbers. (7 pts.) **Put a box around your answer.**

$$\log_6 \frac{x^5 \sqrt[3]{8x + 27}}{(7x^4 - 12)(x + 8)^2}$$

3. Write  $\log x - 9 \log(x^3 + 8) - \frac{5}{4} \log(3x - 7)$  as a single logarithm. (6 pts.) **Put a box around your answer.**

4. Use the change of basis formula to write  $\log_6 66$  in terms of base 10. (3 pts.)

Answer \_\_\_\_\_

5. Solve the following equations.

a.  $27^{7-x} = \frac{1}{81}$  (6 pts.)

Answer \_\_\_\_\_

b.  $6^{5x+7} = 12$  (7 pts.)

Answer \_\_\_\_\_

c.  $\log_3(x-3) = 2 + \log_3(x+5)$  (8 pts.)

Answer \_\_\_\_\_

6. A citrus fruit grower purchased 15 apple trees and 30 peach trees for \$600. The next week the grower

bought 20 apple trees and 45 peach trees for \$875. What is the cost of each tree? Set up a system of equations to solve this problem. Don't forget to identify your variables. (6 pts.) **Do NOT solve the system. Put a box around your answer.**

7. Solve the following systems of equations by the indicated method.

a. 
$$\begin{aligned} 6x - 5y &= -33 \\ 9x + 4y &= 8 \end{aligned}$$
 using the addition method (6 pts.)

Answer \_\_\_\_\_

b. 
$$\begin{aligned} x + 3y &= 12 \\ 4x - 5y &= 14 \end{aligned}$$
 using the substitution method (7 pts.)

Answer \_\_\_\_\_

c.  $x^2 + y^2 = 21$  using any method (substitution or addition) (9 pts.)  
 $x^2 + (y - 5)^2 = 16$

Answer \_\_\_\_\_

8. Determine the solution for the system represented by each augmented matrix. (10 pts.)

a. 
$$\left[ \begin{array}{ccc|c} 2 & -8 & -3 & 7 \\ 0 & 4 & -7 & -38 \\ 0 & 0 & 1 & 5 \end{array} \right]$$

Answer \_\_\_\_\_

b. 
$$\left[ \begin{array}{ccc|c} 1 & -3 & 10 & -5 \\ 0 & 1 & -2 & 9 \\ 0 & 0 & 0 & 3 \end{array} \right]$$

Answer \_\_\_\_\_

9. Solve the following system of equations using Gaussian elimination. Indicate your row operations.

(11 pts.)

$$\begin{aligned}x - 2y + 5z &= 9 \\-4x + 7y - 23z &= -43 \\3x - 5y + 18z &= 34\end{aligned}$$

Answer \_\_\_\_\_