Fall Final Exam Prep
Name ______________________________ **Period** __________ **Date** ___________

Answer each question and show all work clearly on a separate piece of paper.

1. Here are the first three figures of a pattern.

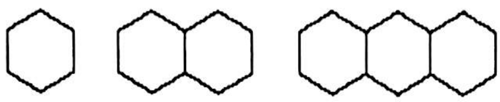


Figure 1 Figure 2 Figure 3

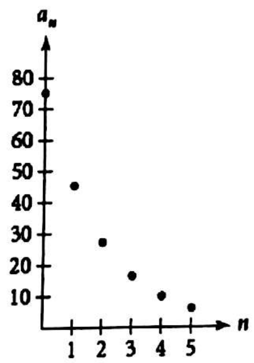
- **a.** List the numbers of line segments in Figures 1–7.
- **b.** Write a recursive formula that generates the sequence you found in part a.
- **c.** How many line segments are in Figure 21?
- **d.** Which figure has 211 line segments?

2. Consider the sequence
15625, 6250, 2500, 1000, ...

- **a.** Write a recursive rule for the sequence. Call the first term u_1.
- **b.** Write an explicit formula for the nth term of the sequence.
- **c.** What is u_{10}?
- **d.** What is the sum of the first ten terms?
- **e.** What is the sum of all the terms?

layers will make their shots

3. Match a recursive formula to the graph and identify the sequence as arithmetic or geometric.



- **A.** $a_0 = 75$ and $a_n = a_{n-1} - 30$ where $n \geq 1$
- **B.** $a_0 = 75$ and $a_n = 100 - a_{n-1}$ where $n \geq 1$
- **C.** $a_0 = 75$ and $a_n = 0.6 \cdot a_{n-1}$ where $n \geq 1$

4. Give the recursive formula for a sequence whose graph fits the given description.

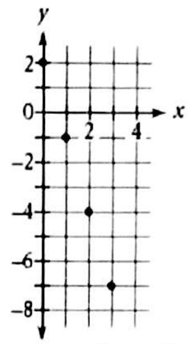
- **a.** Nonlinear and decreasing
- **b.** Linear and increasing
- **c.** Nonlinear and increasing, with a long-run value that is not zero

5. Consider the arithmetic sequence defined by the formula

$u_0 = -2.25$
$u_n = u_{n-1} + 1.25$ where $n \geq 1$

- **a.** Write an explicit formula for the sequence.
- **b.** Find the value of u_{47}.
- **c.** Find the value of n for which $u_n = 64$

6. Consider the graph at right.



a. Write the recursive formula that generates the points on the graph.
b. Write a linear equation (in x and y) for the line that passes through the points.

7. Solve this system using any method.

$$\begin{cases} 2x = 10 - 5y \\ 3 - 7x = 14 + 6y \end{cases}$$

8. Consider this system of inequalities.

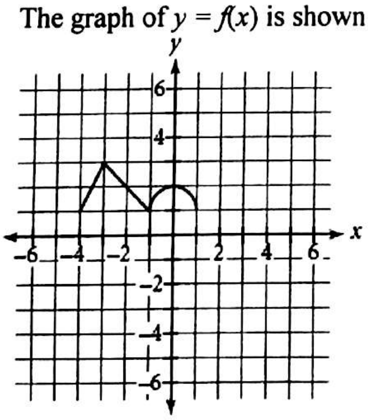
$$\begin{cases} y \le 4 \\ y \ge 1 \\ y > 2 - 2x \\ 3x + 4y < 16 \end{cases}$$

a. Graph the feasible region and find its vertices.
b. Find the value in the feasible region that minimizes the value of the expression $2x - 5y$.
c. Find the value in the feasible region that maximizes the value of the expression $x + y$.

9. If $f(x) = -\frac{x}{5} + 1$, $g(x) = 3x^2$, and $h(x) = (x - 4)^2$, find each value.

a. $f(g(-2))$
b. $h(g(5))$
c. $g(f(x))$

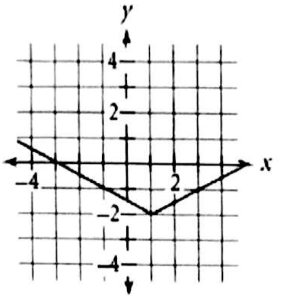
10. The graph of $y = f(x)$ is shown here. Sketch the graph of each related function.



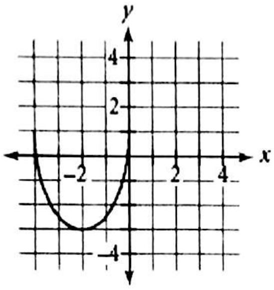
a. $y = f(x - 3)$
b. $y = -f(x)$
c. $y = f(x) - 3$
d. $y = 3f(x)$

11. For each graph, name the parent function and write an equation of the graph.

a.



b.



12. Solve for y.

$$\left(\frac{y}{7}\right)^2+\left(\frac{x-1}{3}\right)^2=1$$

13. Solve for x.

$$\left|\frac{x+5}{2}\right|=6$$

14. Use the properties of exponents and logarithms to rewrite each expression in another form.

a. $m^{4/5}$

b. $4 \cdot \log b$

c. $\log_x 9$

d. $\left(\frac{xy^4z^2}{xy^2z^5}\right)^{-1}$

e. $3^x \cdot 9^y$

f. $\log 7 + \log 3$

15. Solve.

a. $6 \log_{1.75} x = 24$

b. $\log \frac{x}{10^2} = -2$

c. $3.5x^{-4} = 175$

d. $\sqrt[7]{x^5} = -7$

e. $4.5^{x2} = 720$

f. $4\sqrt{3x-9} - 7 = 17$

16. Find an equation of the exponential curve that passes through (1, 280) and (5, 17.5).

17. Sketch a graph of this equation.

$$\frac{y+1}{2} = (x-4)^2$$

18. Find the inverse of each function, and tell whether the inverse is itself a function.

a. $y = \frac{3}{8}x + 4$

b. $y = (x+2)^2$

c. (–4, –2), (–2, –1), (0, 0), (2, 1), (4, 2)

19 Determine whether each equation is true or false. If it is false, rewrite the right side to make it true.

a. $\log x - \log y = \log \frac{x}{y}$

b. $\log x^7 = (\log x)^7$

c. $\log_7 z = \frac{\log z}{\log 7}$

d. $\log 56 = \log 7 \bullet \log 8$