

Exponential Functions Quiz Study Guide (Section 7, topics 1-5)

1. Write the recursive and explicit formulas for the sequences below. Then use the explicit formula to find the 8th term in each sequence.

A. 14, 84, 504, 3024, ...
 $r = 6$
 recursive: $a_n = 6 \cdot a_{n-1}$
 explicit: $a_n = 14 \cdot 6^{n-1}$
 $a_8 = 14 \cdot 6^{8-1} = a_8 = 3,919,104$

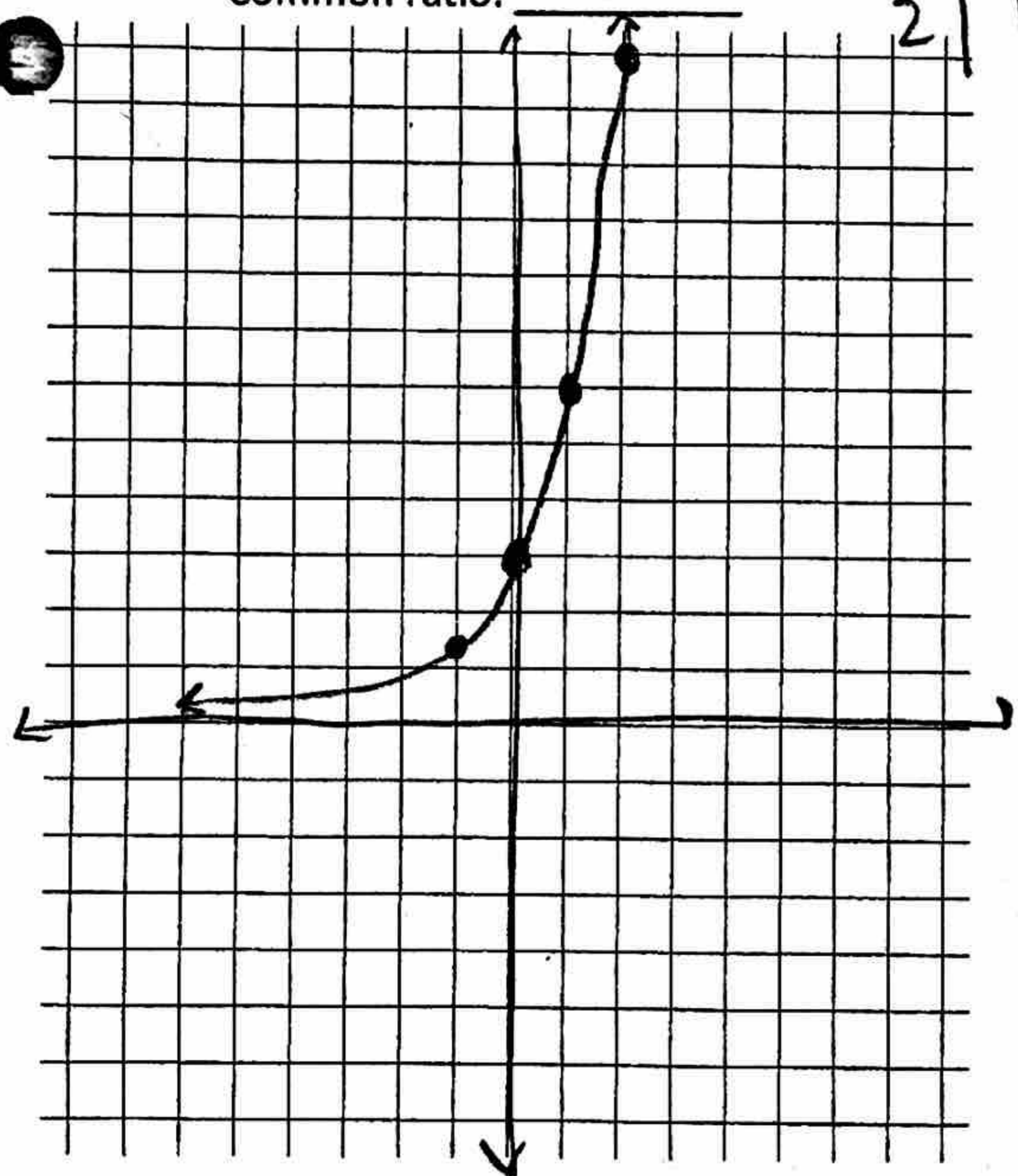
B. 648, 324, 162, 81, ...
 $r = .5$ or $\frac{1}{2}$
 recursive: $a_n = \frac{1}{2} \cdot a_{n-1}$
 explicit: $a_n = 648 \cdot \frac{1}{2}^{n-1}$
 $a_8 = 648 \cdot \frac{1}{2}^{8-1}$
 $a_8 = 5.0625$

2. Identify the y-intercept and common ratio of the functions below. Then, graph the exponential functions and describe their end behavior.

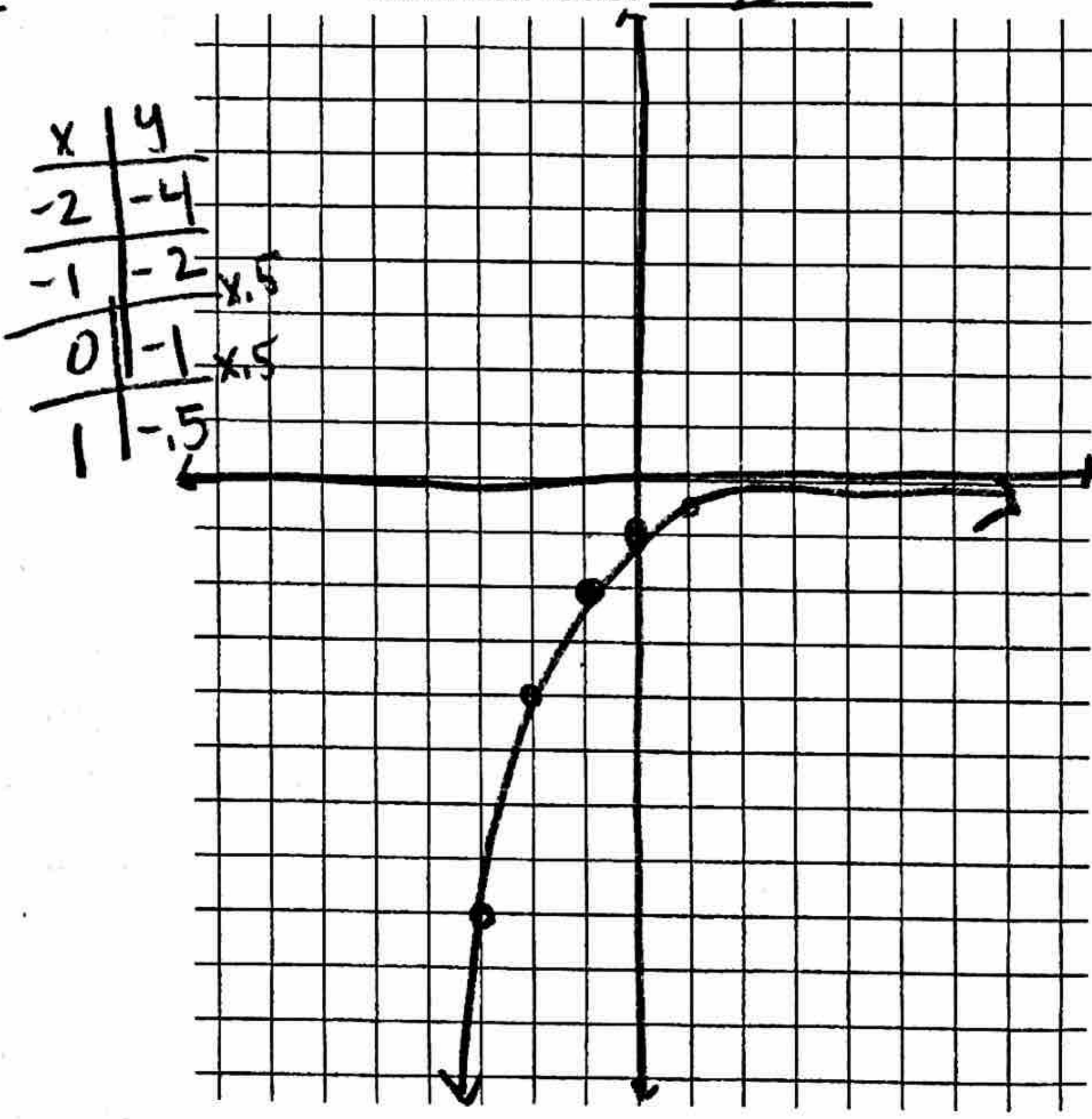
A. $f(x) = 3 \cdot 2^x$
 Y-intercept: 3
 Common ratio: 2

x	y
-1	1.5
0	3
1	6
2	12

B. $f(x) = -(\frac{1}{2})^x$
 Y-intercept: -1
 Common ratio: $\frac{1}{2}$



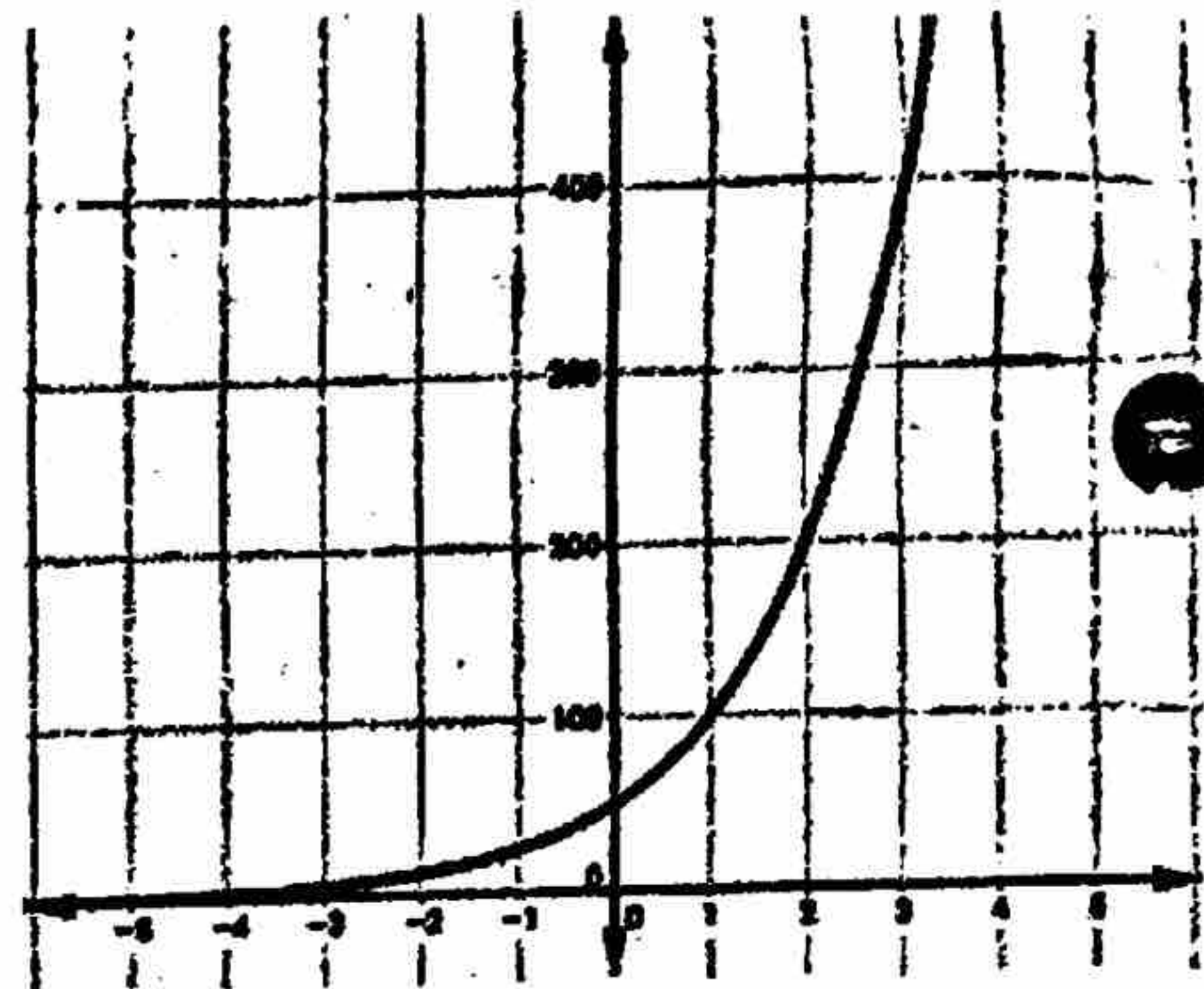
End Behavior
 As x increases, y increases
 As x decreases, y approaches zero



End Behavior
 As x increases, y approaches zero
 As x decreases, y decreases

3. Given the following table and graph,

	$f(x)$
0	50
1	100
2	200
3	400



A. Write the exponential function represented above.

$$f(x) = 50 \cdot 2^x$$

B. Which of the following could be represented by the table and graph?

A.) A cure has been found for an infectious disease and the number of people with the disease is decreasing by 50% every day.

B.) You drive to preview your top choice in colleges. The cruise control keeps your car traveling at a constant rate.

C.) The height of a ball as a function of time after it is dropped from a building.

D.) You are performing an experiment in science class in which the amount of bacteria you start with doubles every hour.

4. Classify each real-world situation below by the most appropriate model, exponential growth or exponential decay.

A. The processing power of a cell phone between the years 1998 and 2015.

growth

B. The NCAA tournament starts with 64 schools. Half of the teams are eliminated each round.

decay

5. OMG BUGS! The campers at Math Nation Camp have noticed that bugs are beginning to invade the camp grounds. The counselors decide to bring in lizards and frogs to eat the bugs, and it works! The bug population begins to shrink exponentially.

A. This is an example of exponential decay.

B. Suppose there were 5000 bugs and the frogs and lizards eat 25% of the bugs per day.

The correct function to model this situation is $f(x) = 5000 \cdot 0.75^x$. Where the "starting number" (y-intercept) is 5,000. And the common ratio is .75.

C. About how many bugs will be remaining after a week? Two weeks?

$$f(7) = 5,000 \cdot 0.75^7$$

$$f(7) \approx 667$$

$$f(14) = 5,000 \cdot 0.75^{14}$$

$$f(14) \approx 89$$

6. Since 2008, the amount of money spent at restaurants in the United States has increased about 7% each year. In 2008, \$360 billion was spent at restaurants. If the trend continues, about how much will be spent at restaurants in 2018?

A. Function = $f(x) = 360 \cdot 1.07^x$

$$f(x) = 360 \cdot 1.07^{10}$$

B. Amount spent in 2018 = ≈ 708 billion.