

Unit 6, Day 01 HW: Graphing Exponential Functions

Name: Master Eg

☺ use limited technology. ONLY if you get stuck!

How do you KNOW an exponential function models growth?  $b > 1$  ...decay?  $0 < b < 1$

What do ALL exponential functions have in common?

They all have an asymptote  $y = k$ ; They all have a domain of  $\mathbb{R}$

1-3: Which of the following functions represent exponential growth or exponential decay? How do you know?

1.  $f(x) = \left(\frac{4}{5}\right)^x$  Decay  
 $0 < b < 1$

2.  $f(x) = \left(\frac{5}{4}\right)^x$  Growth  
 $b > 1$

3.  $f(x) = 3^{-x} = \left(\frac{1}{3}\right)^x$  Decay  
 $0 < b < 1$

4-9: Match each of the following functions with its graph.

B 4.  $f(x) = -3^x$  Neither

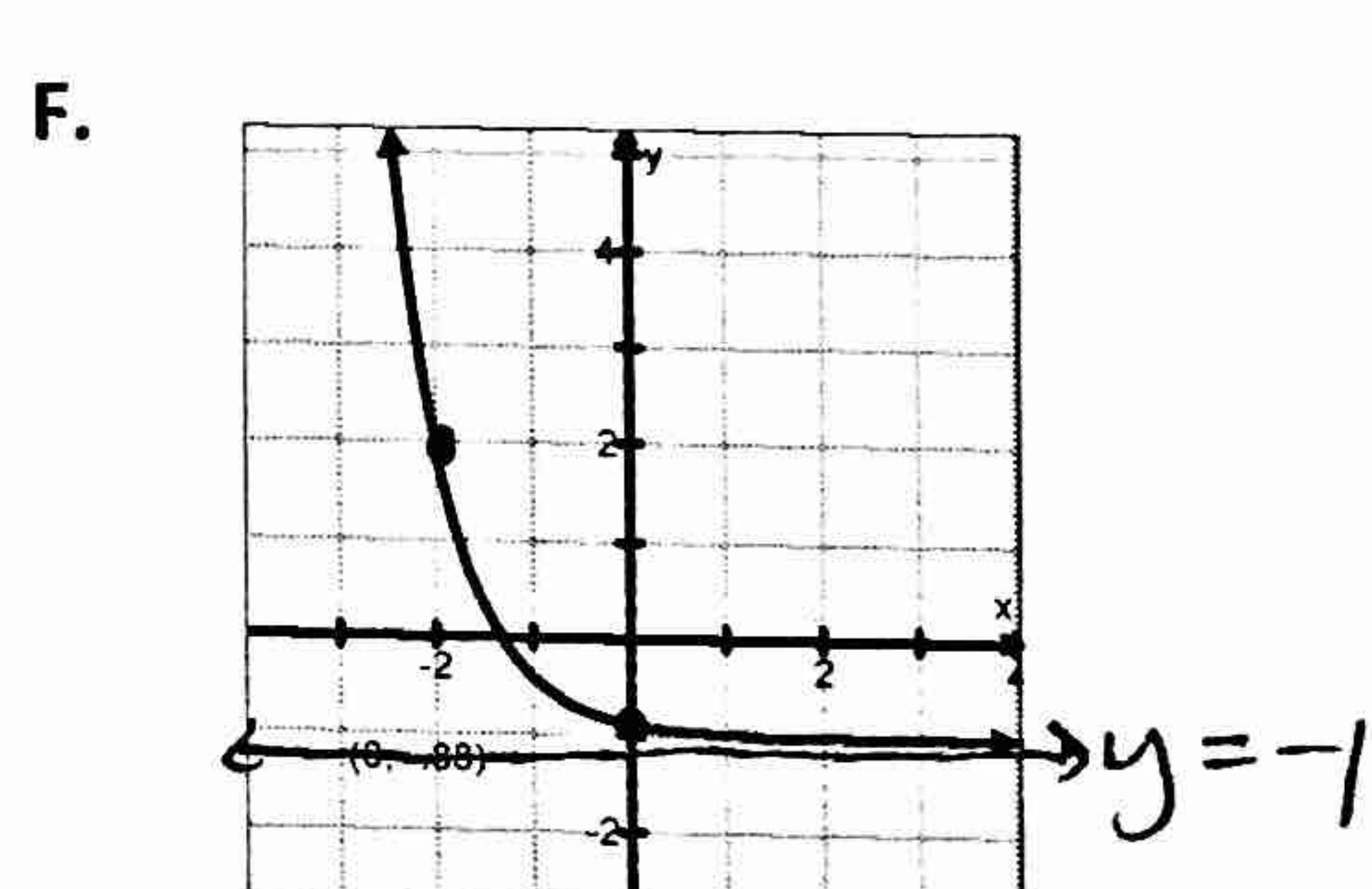
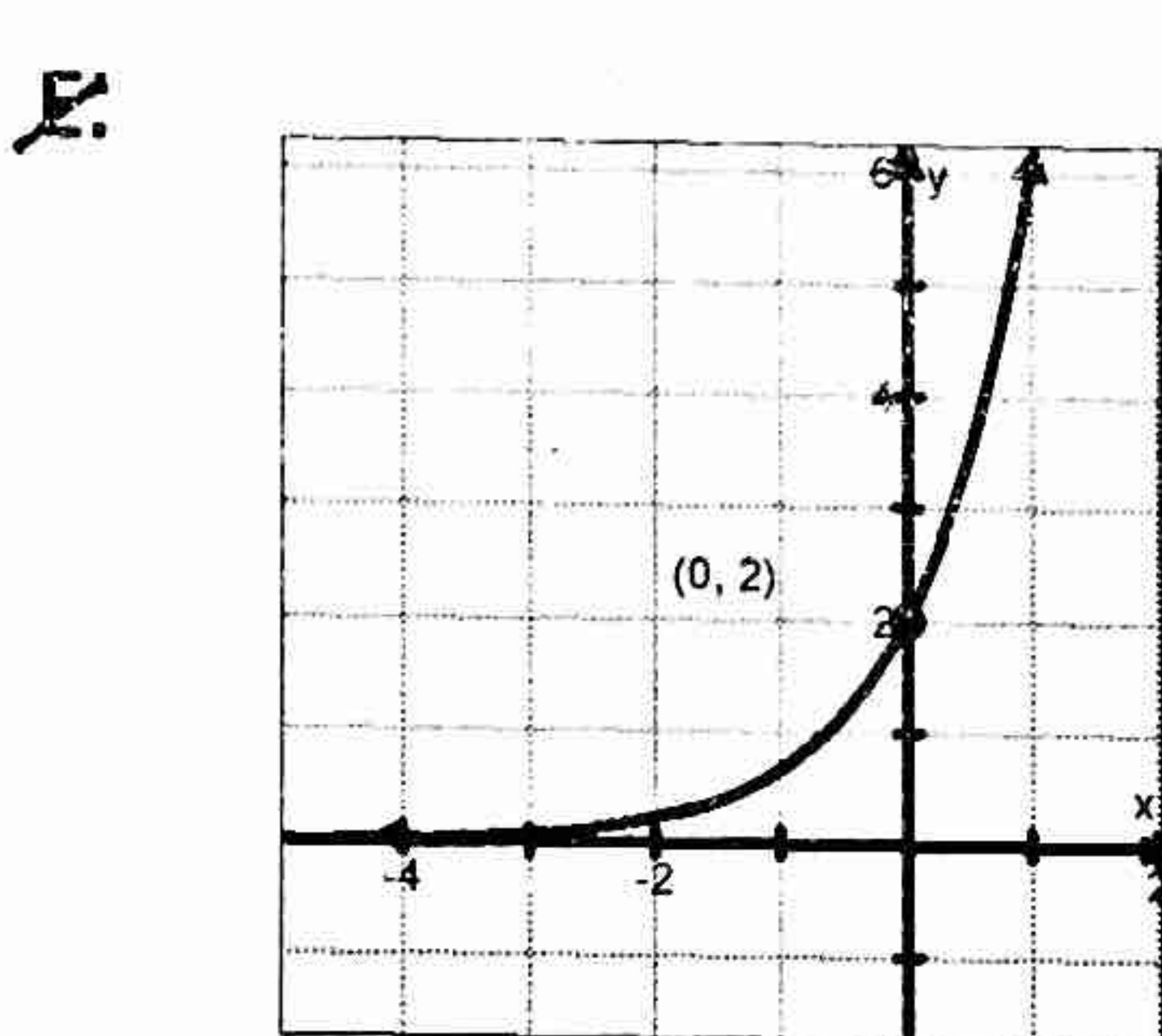
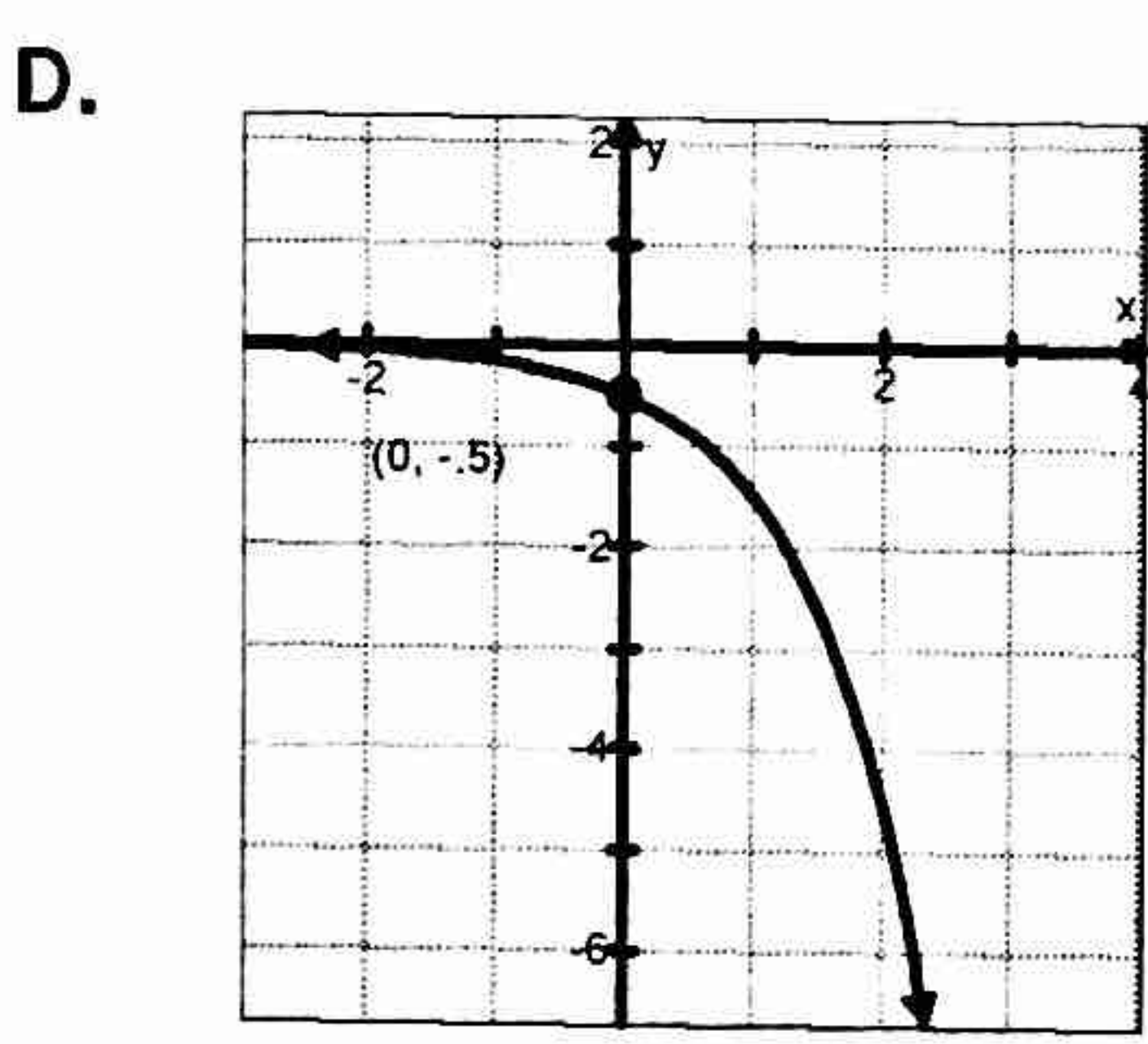
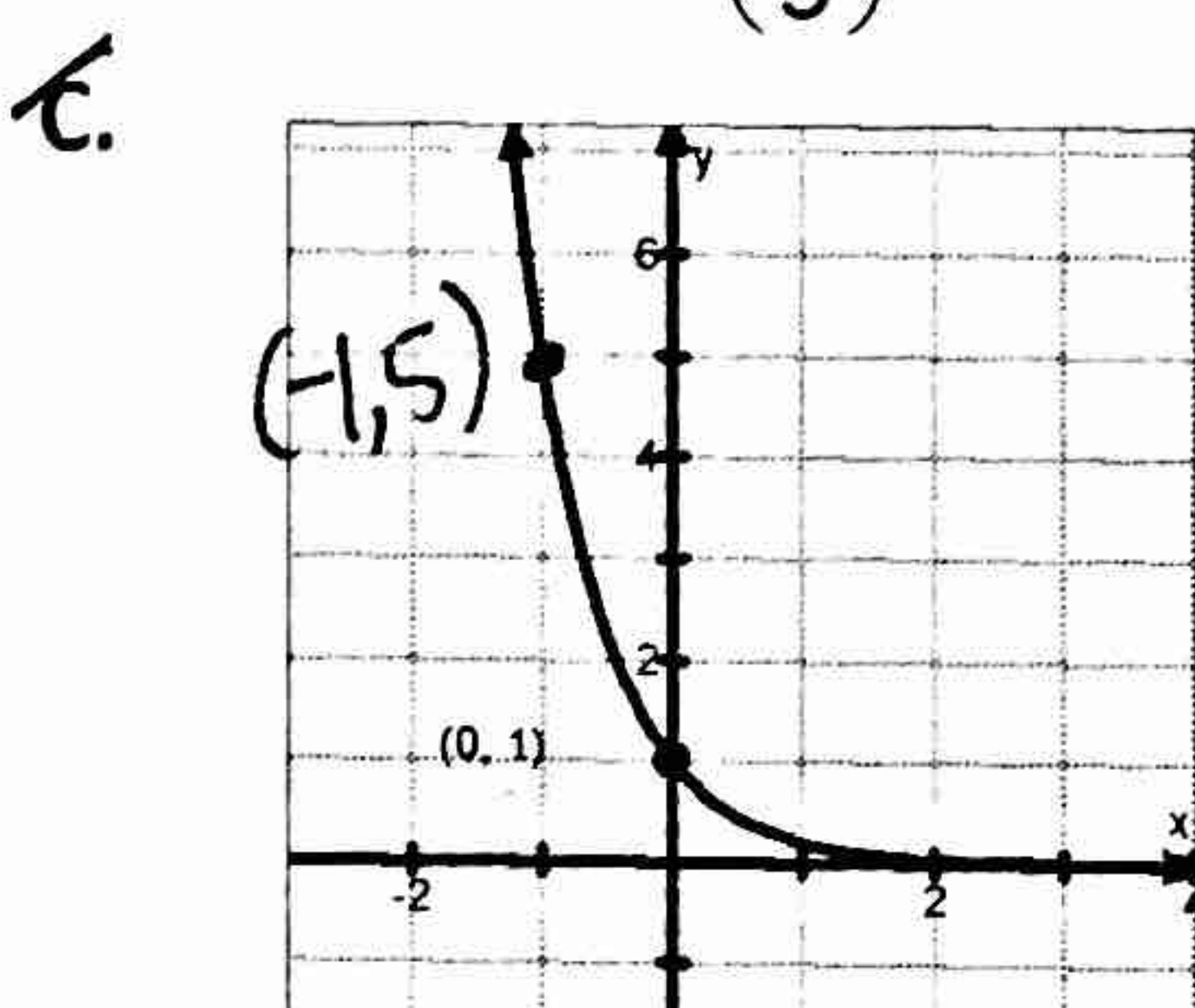
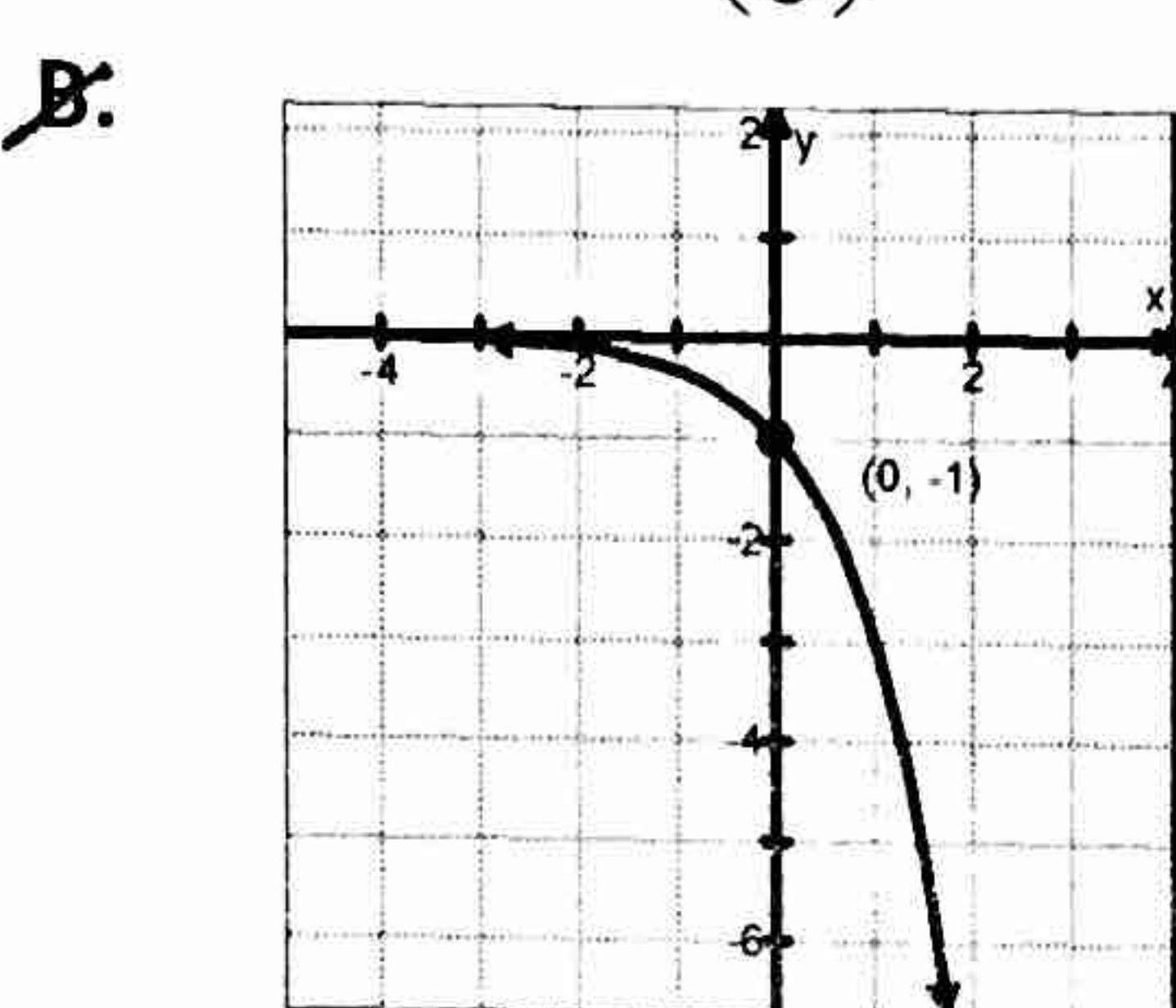
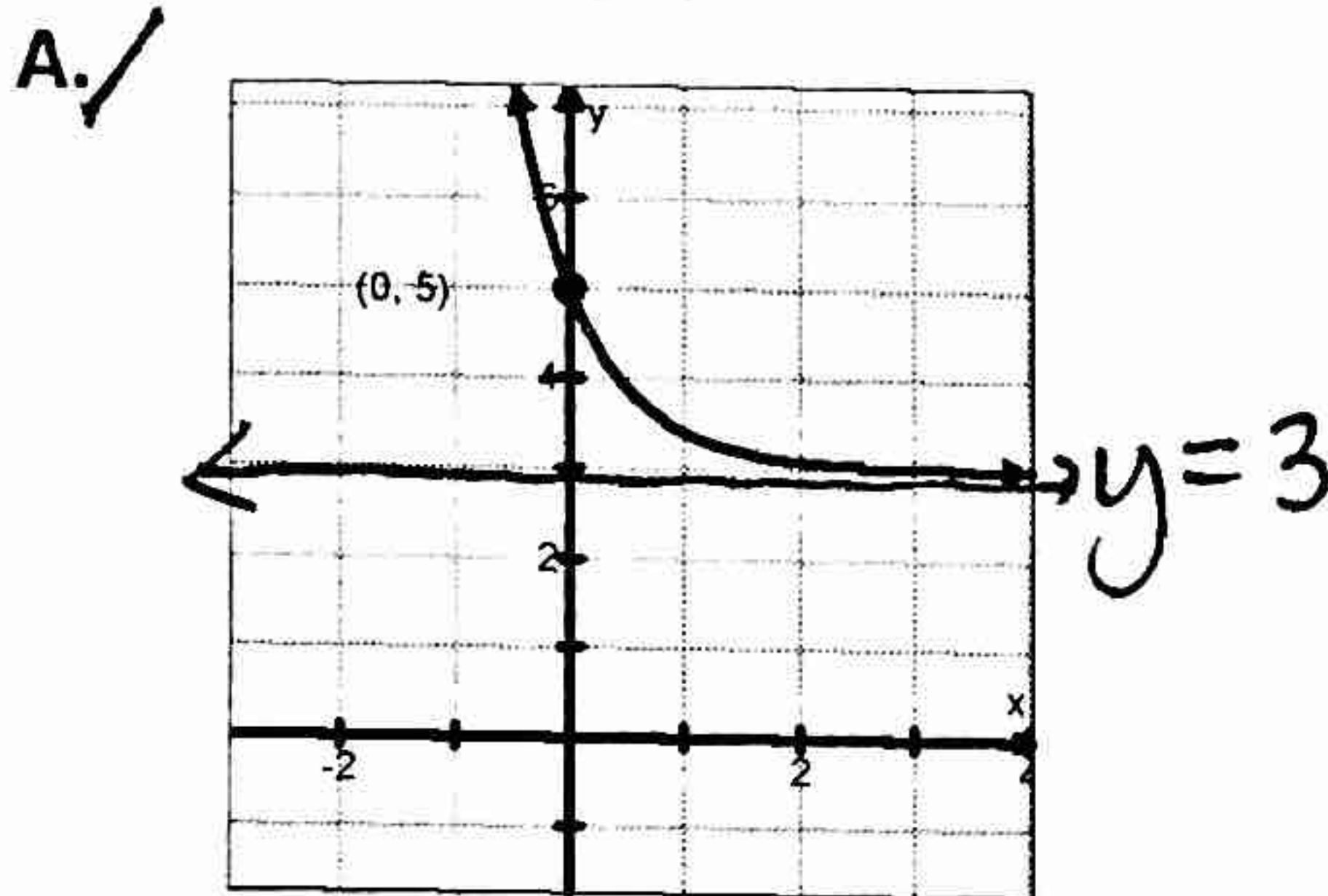
E 5.  $f(x) = 2(3)^x$  G

D 6.  $f(x) = -\frac{1}{2}(3^x)$  Neither

C 7.  $f(x) = \left(\frac{1}{5}\right)^x$  D

A 8.  $f(x) = 2\left(\frac{1}{5}\right)^x + 3$  D

F 9.  $f(x) = 3\left(\frac{1}{5}\right)^{x+2} - 1$  D



10-12: Explain the transformation of  $f(x)$  that would occur to create  $g(x)$ .

10.  $f(x) = \left(\frac{1}{2}\right)^x$   
 $g(x) = \left(\frac{1}{2}\right)^{x-1} + 2$   
Shift right 1 & up 2

11.  $f(x) = 3^x$   
 $g(x) = 3^{x+2} - 4$   
Shift left 2 & down 4

12.  $f(x) = 10^x$   
 $g(x) = -10^{x+2}$   
Shift left 2 & reflect over the x-axis

13-16: For each function, state the domain and range in interval notation & the equation of each asymptote.

13.  $y = 2^{x-1}$    
Domain:  $(-\infty, \infty)$   
Range:  $(0, \infty)$   
Asym:  $y = 0$

14.  $y = 2^x - 3$    
Domain:  $(-\infty, \infty)$   
Range:  $(-3, \infty)$   
Asym:  $y = -3$

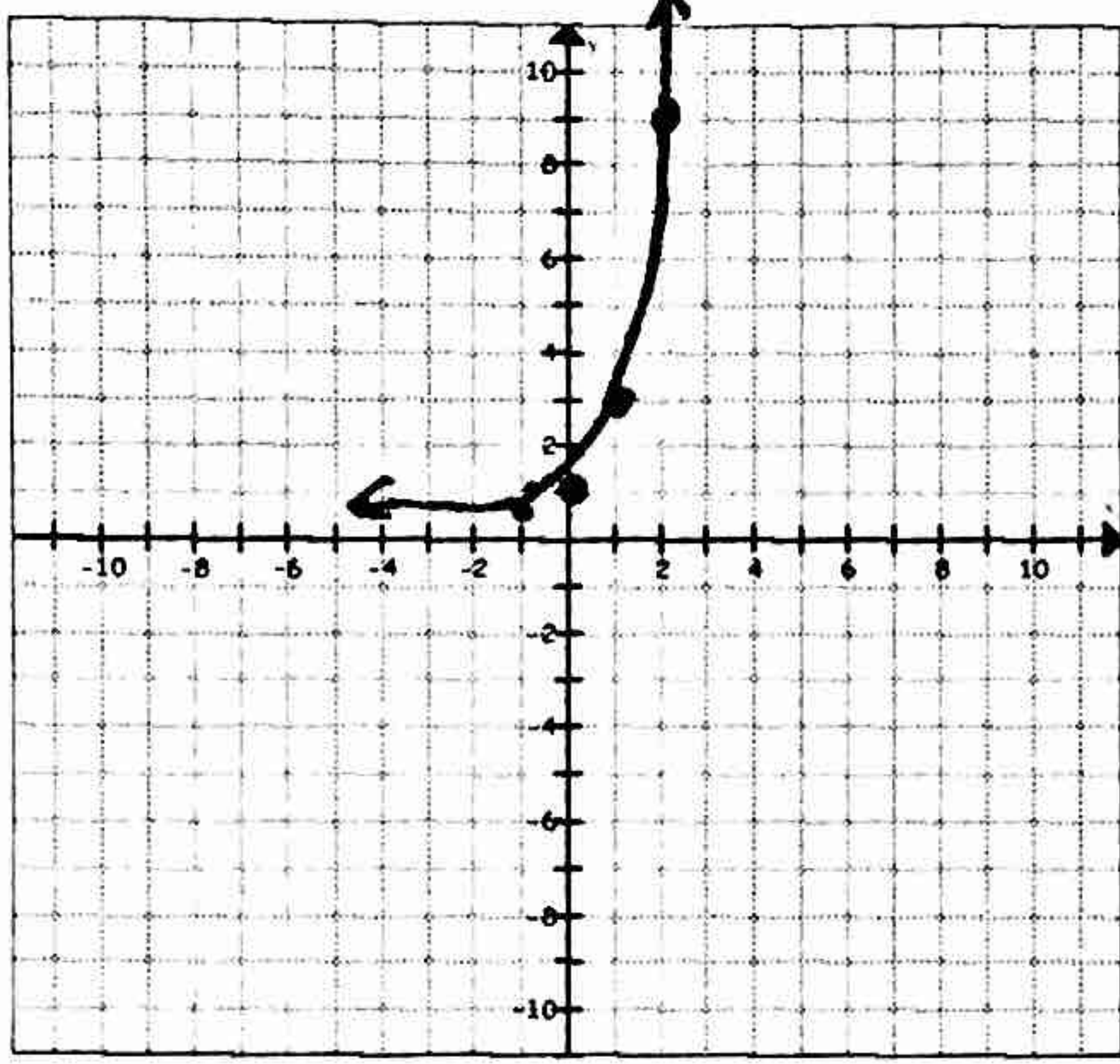
15.  $y = \left(\frac{1}{3}\right)^{x+1} - 2$    
Domain:  $(-\infty, \infty)$   
Range:  $(-2, \infty)$   
Asym:  $y = -2$

16.  $y = 3^{-x+2} + 5$  Think!  
Domain:  $(-\infty, \infty)$   
Range:  $(5, \infty)$   
Asym:  $y = 5$   
 $y = 3^{-(x-2)} + 5$   
 $= \left(\frac{1}{3}\right)^{x-2} + 5$

17-25: Graph each exponential function WITHOUT a calculator. State the equation of the asymptote, the y-intercept, and the domain and range using interval notation.

17.  $f(x) = 3^x$

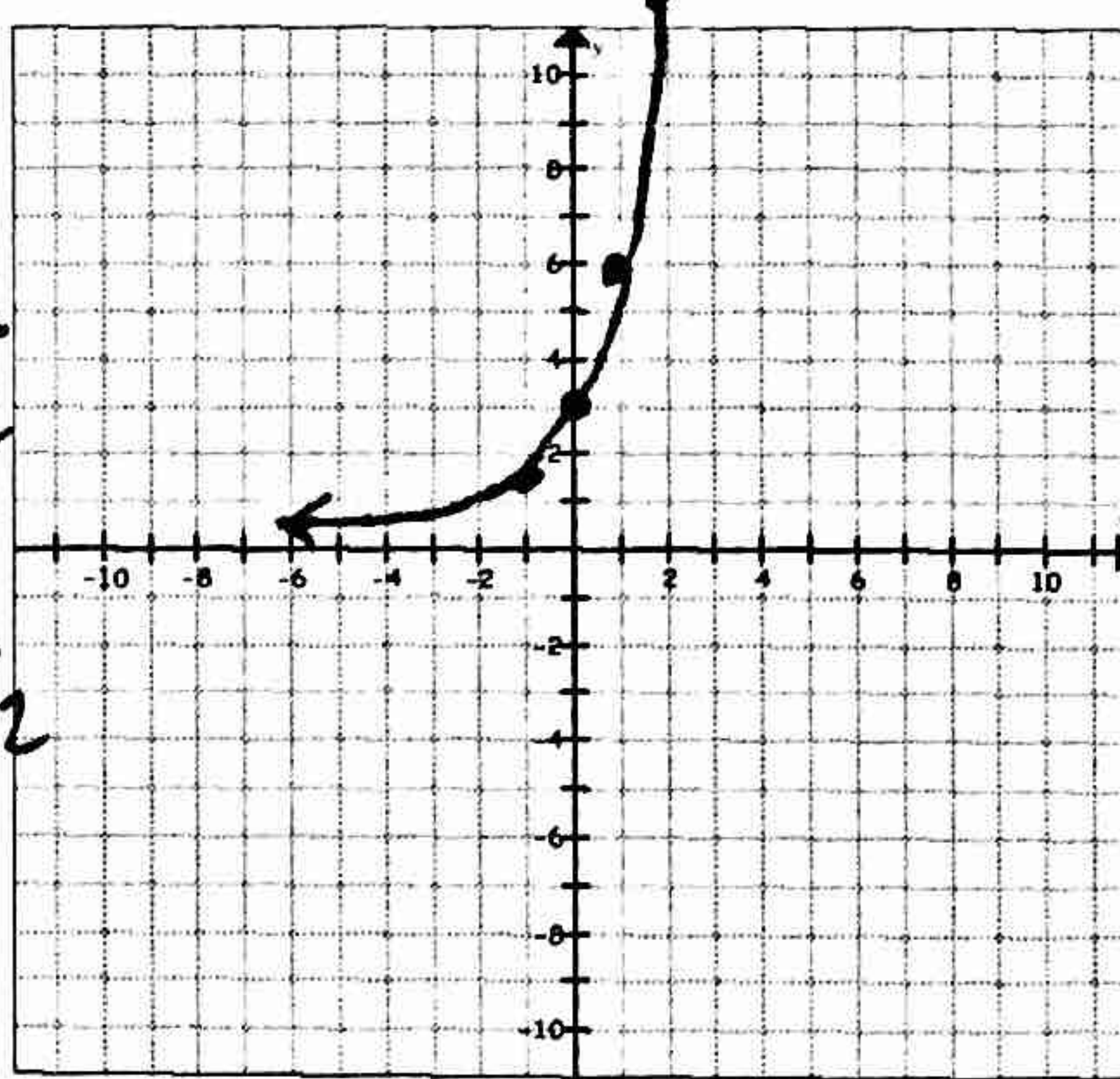
x	y
-1	$\frac{1}{3}$
0	1
1	3
2	9



asymptote:  $y=0$   
 y-intercept:  $(0, 1)$   
 domain:  $(-\infty, \infty)$   
 range:  $(0, \infty)$

18.  $f(x) = 3(2)^x$

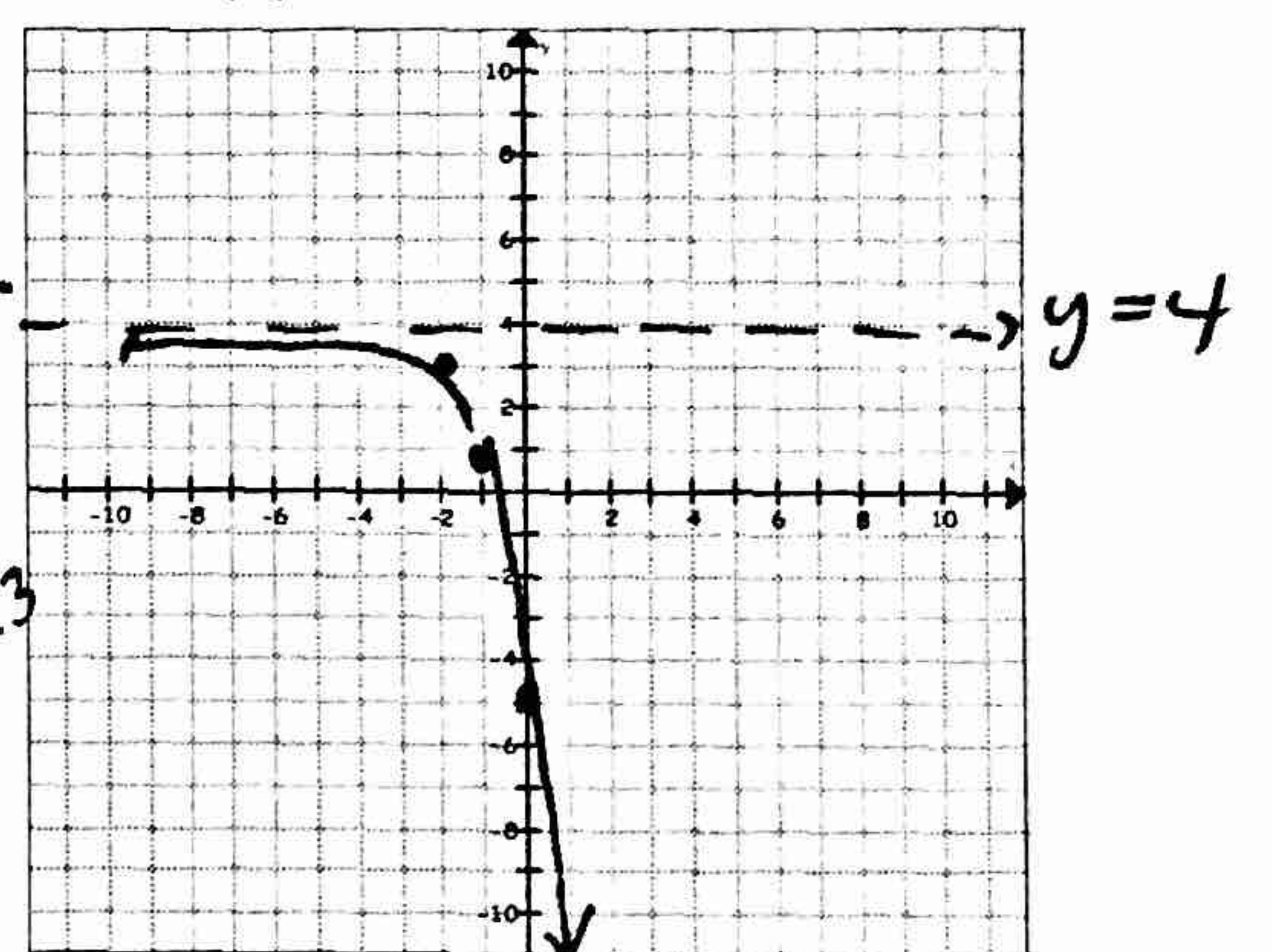
x	y
-1	$\frac{3}{2}$
0	3
1	6
2	12



asymptote:  $y=0$   
 y-intercept:  $(0, 3)$   
 domain:  $(-\infty, \infty)$   
 range:  $(0, \infty)$

19.  $f(x) = -3^{x+2} + 4$

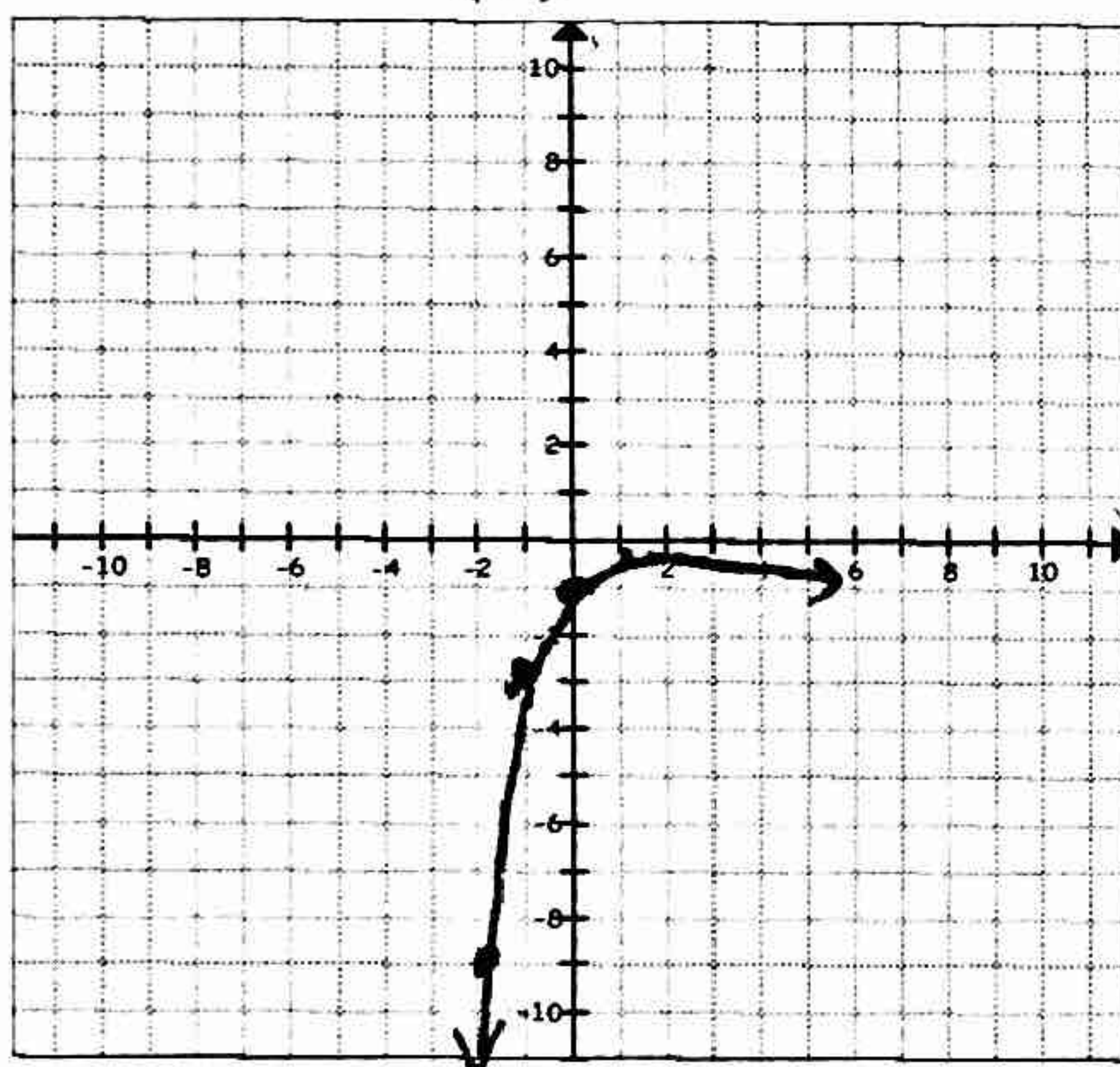
x	y
-2	3
-1	1
0	-5
1	-23



asymptote:  $y=4$   
 y-intercept:  $(0, -5)$   
 domain:  $(-\infty, \infty)$   
 range:  $(-\infty, 4)$

20.  $f(x) = -\left(\frac{1}{3}\right)^x$

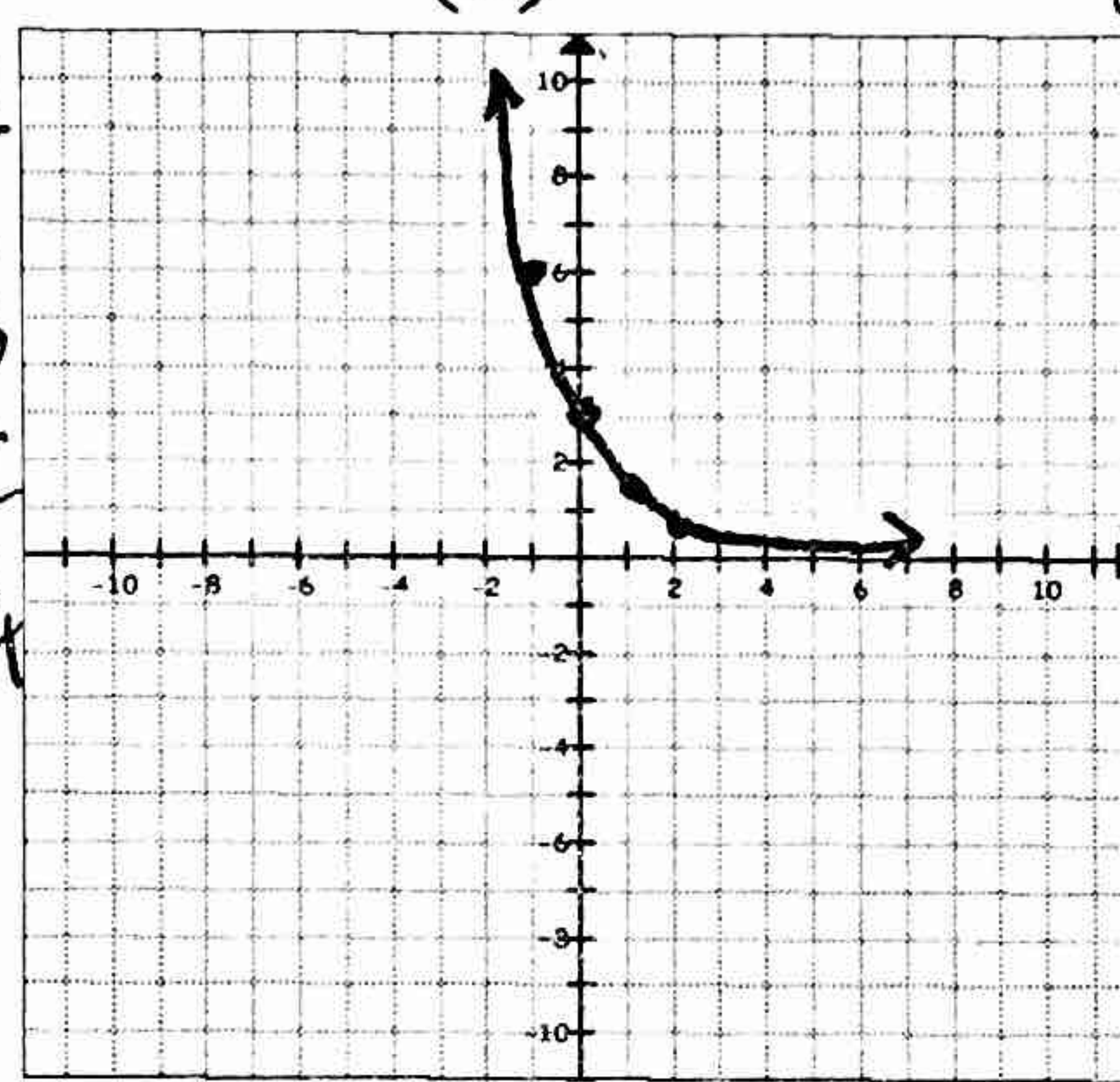
x	y
0	-1
1	$-\frac{1}{3}$
2	$-\frac{1}{9}$



asymptote:  $y=0$   
 y-intercept:  $(0, -1)$   
 domain:  $(-\infty, \infty)$   
 range:  $(-\infty, 0)$

21.  $f(x) = 3\left(\frac{1}{2}\right)^x$

x	y
0	3
1	$\frac{3}{2}$
2	$\frac{3}{4}$

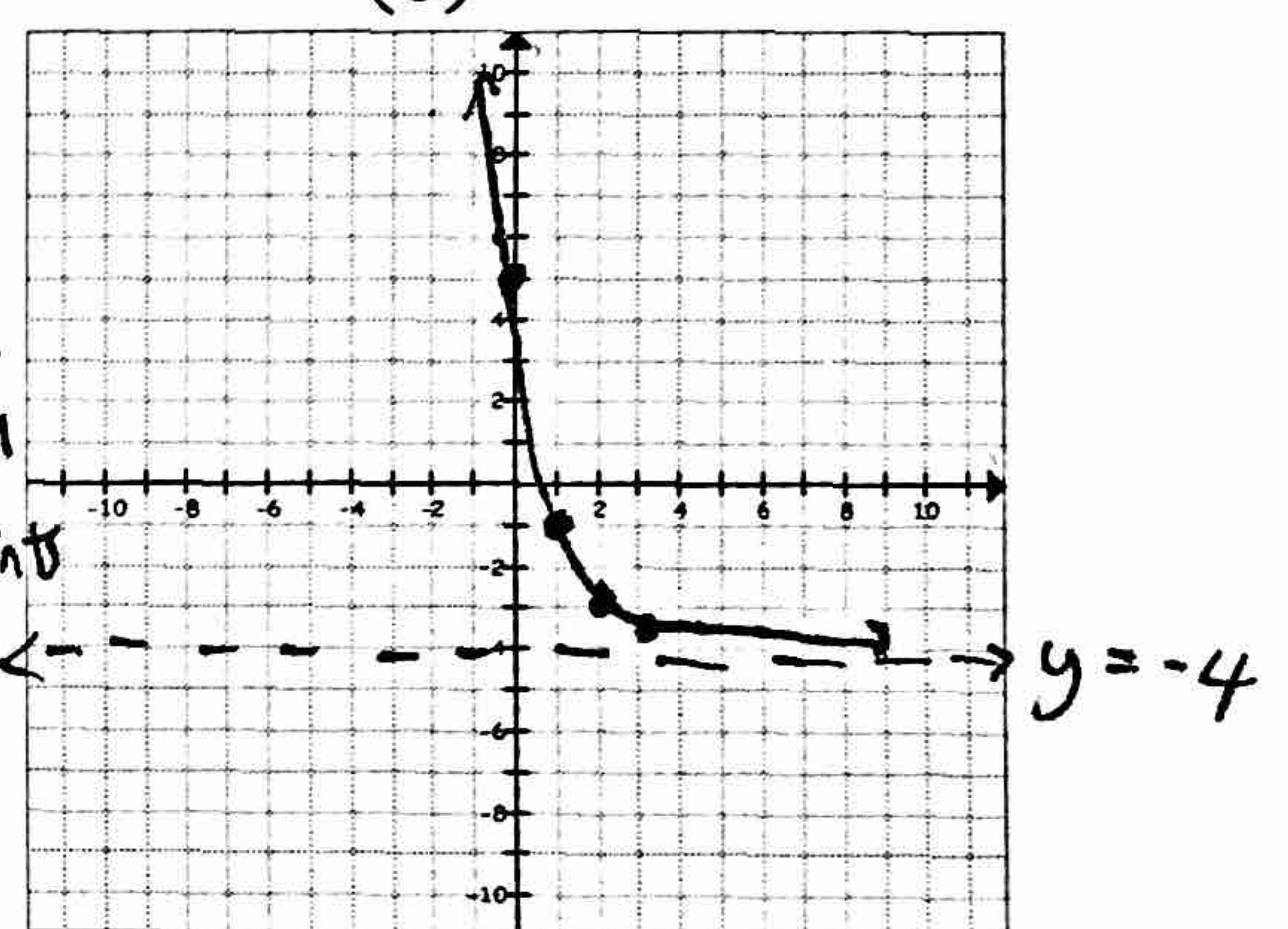


asymptote:  $y=0$   
 y-intercept:  $(0, 3)$   
 domain:  $(-\infty, \infty)$   
 range:  $(0, \infty)$

22.  $f(x) = \left(\frac{1}{3}\right)^{x-2} - 4$

x	y
-1	3
0	1
1	$\frac{1}{3}$

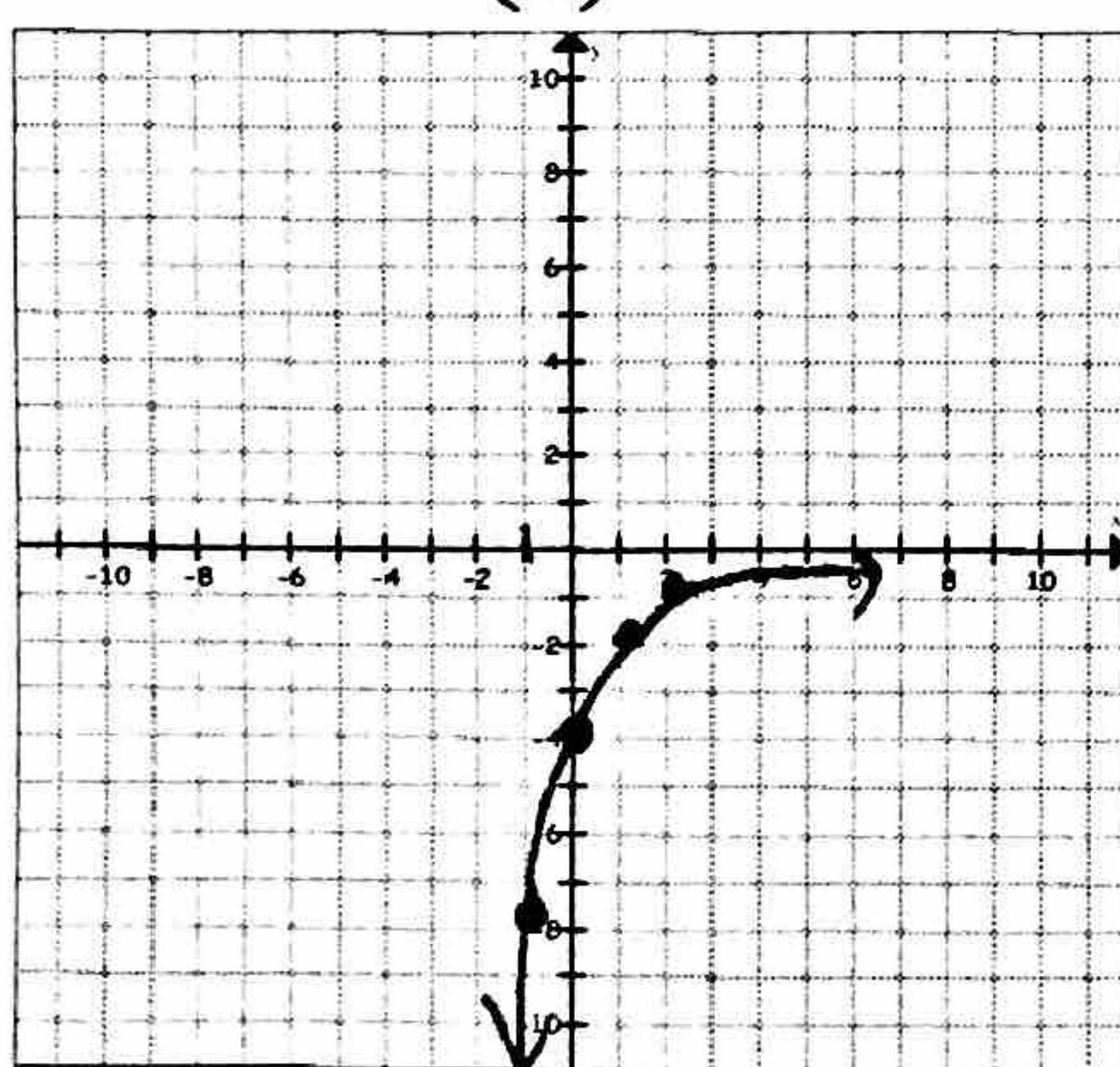
shift all points  $\rightarrow 2$   
 $\downarrow 4$



asymptote:  $y=-4$   
 y-intercept:  $(0, 5)$   
 domain:  $(-\infty, \infty)$   
 range:  $(-4, \infty)$

23.  $h(x) = -2\left(\frac{1}{2}\right)^{x-1}$

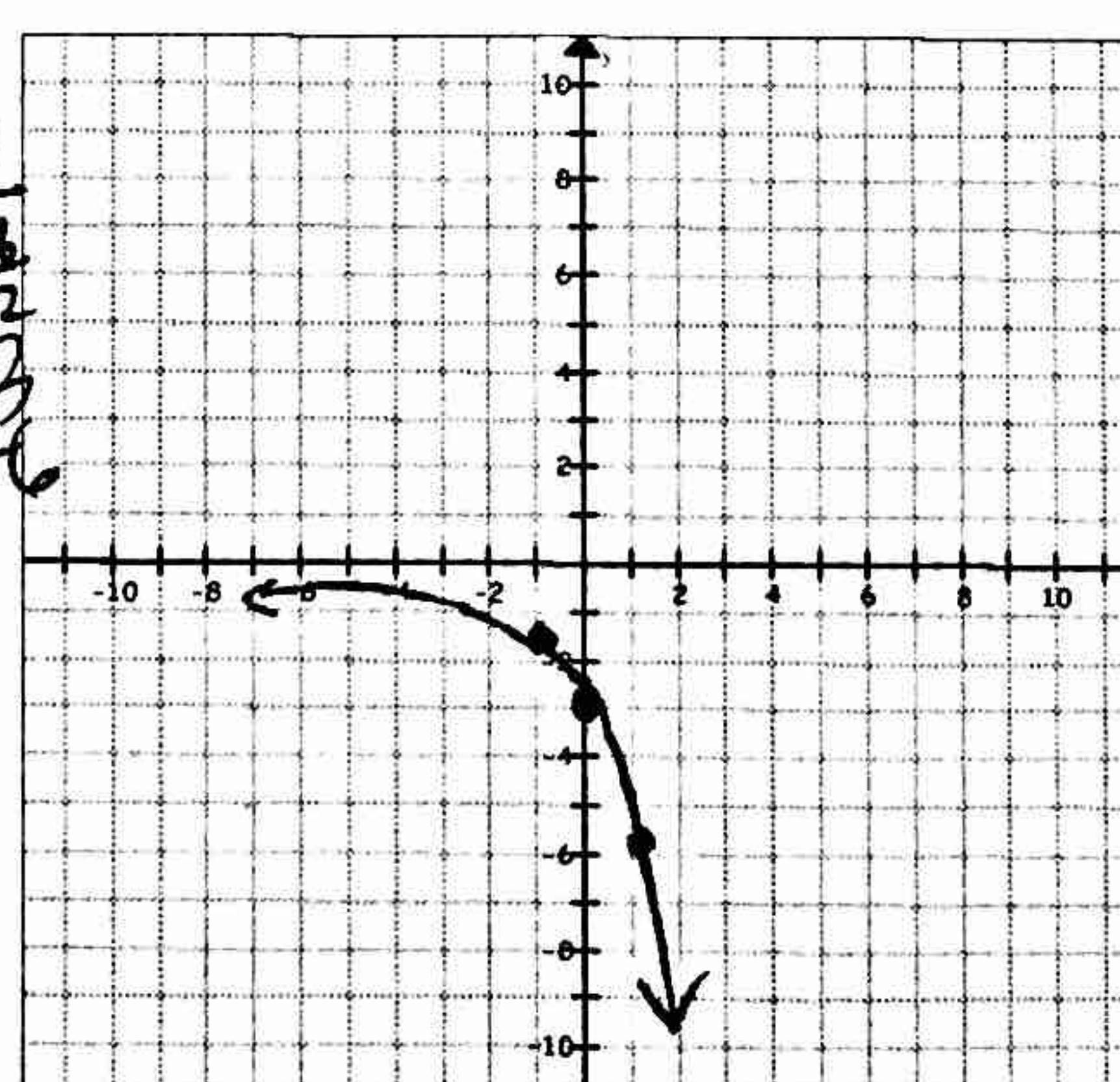
x	y
0	-1
1	-2
2	-4



asymptote:  $y=0$   
 y-intercept:  $(0, -4)$   
 domain:  $(-\infty, \infty)$   
 range:  $(-\infty, 0)$

24.  $g(x) = -3(2^x)$

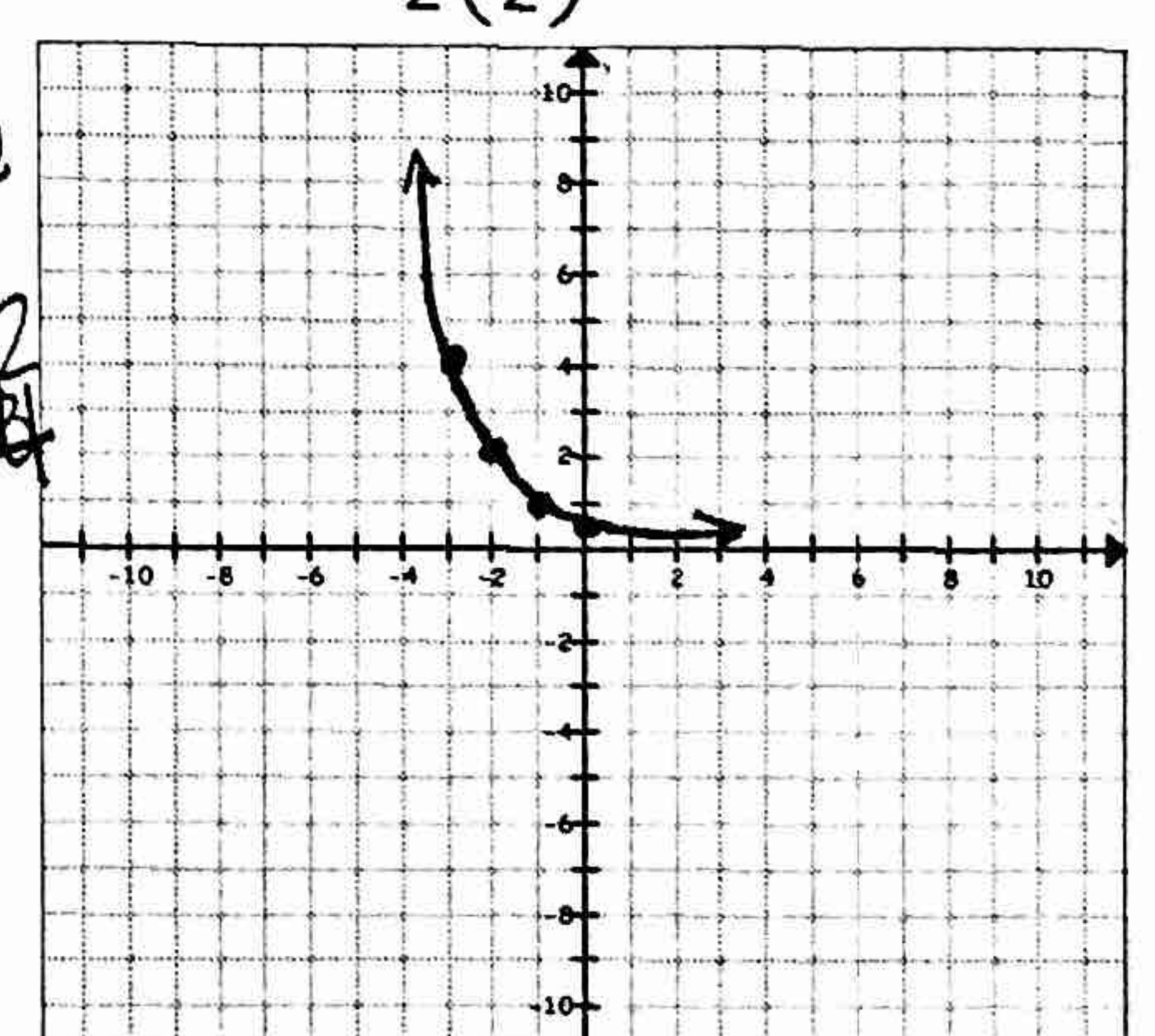
x	y
0	-3
1	-6
2	-12



asymptote:  $y=0$   
 y-intercept:  $(0, -3)$   
 domain:  $(-\infty, \infty)$   
 range:  $(-\infty, 0)$

25.  $k(x) = \frac{1}{2}\left(\frac{1}{2}\right)^x$

x	y
0	$\frac{1}{2}$
1	$\frac{1}{4}$
2	$\frac{1}{8}$



asymptote:  $y=0$   
 y-intercept:  $(0, \frac{1}{2})$   
 domain:  $(-\infty, \infty)$   
 range:  $(0, \infty)$