

Essential Question: What is an exponential function and how do you graph it?

Warm-Up

Simplify: 1)  $\left(\frac{2}{5}\right)^2 = \frac{4}{25}$

2)  $\left(\frac{2}{5}\right)^x = \frac{2^x}{5^x}$

**Exponential Function:**  $y = ab^x$

Exponential Growth

$y = ab^x$   
 $b > 1$

Exponential Decay

$y = ab^x$   
 $0 < b < 1$

Determine whether these exponential functions represent growth or decay. Explain how you know.

1.  $y = 7^x$  growth base  $> 1$   
 2.  $y = \left(\frac{1}{3}\right)^x$  decay base  $0 < x < 1$   
 3.  $y = (2)^x$  growth base  $> 1$   
 4.  $y = \left(\frac{2}{3}\right)^x$  decay base  $0 < x < 1$   
 5.  $y = \left(\frac{7}{6}\right)^x$  growth base  $> 1$   
 6.  $y = 3^x$  growth base  $> 1$

To Graph

1. Make a table for the exponential function.
2. Plot the 5(or more) points from your t-chart.
3. Draw in the exponential function.

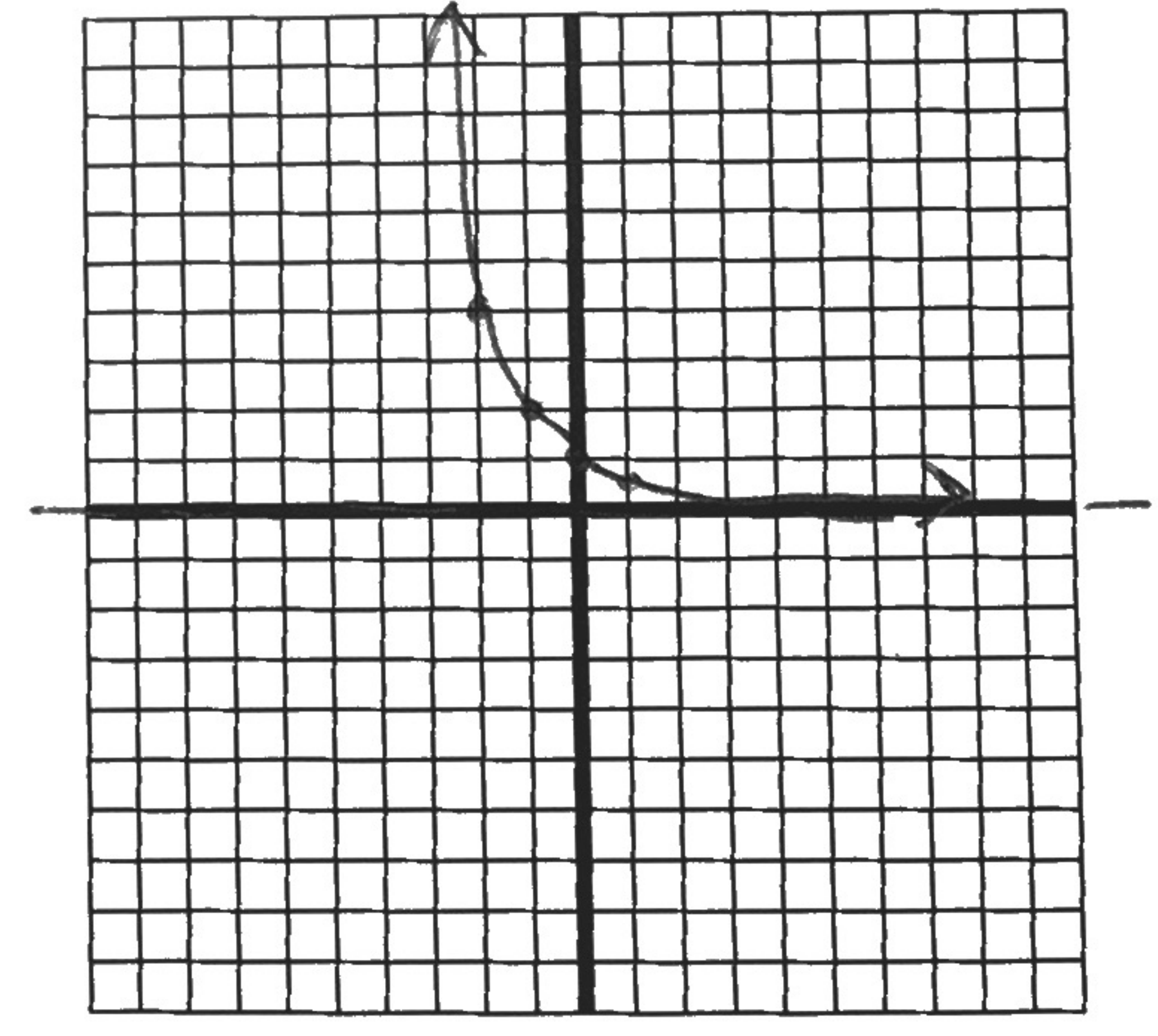
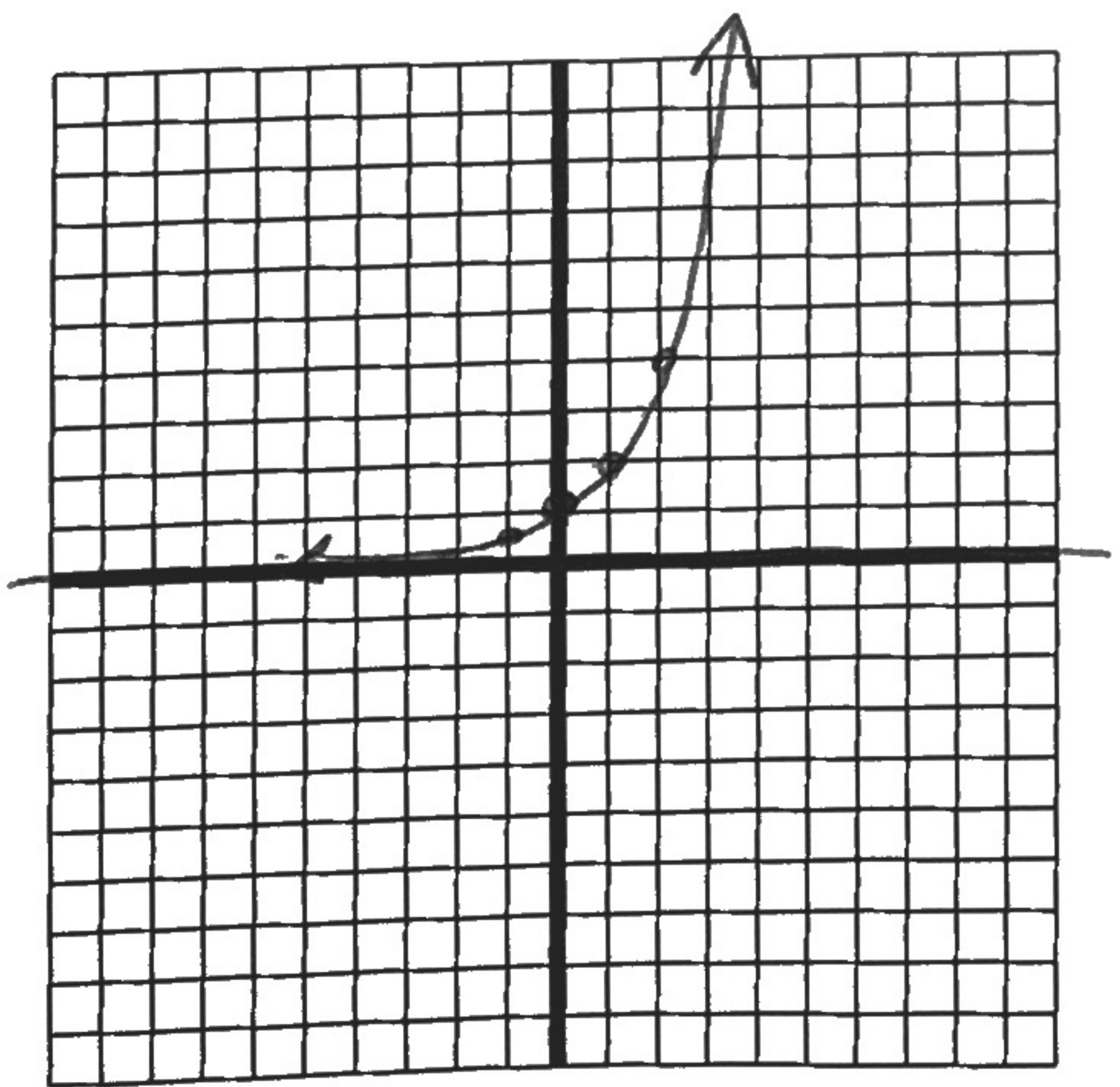
EXAMPLES

1.  $y = 2^x$   
 Growth or Decay?  
 growth  
 Asymptote:  
 $y = 0$

x	y
-2	1/4
-1	1/2
0	1
1	2
2	4

2.  $y = \left(\frac{1}{2}\right)^x$   
 Growth or Decay?  
 decay  
 Asymptote:  
 $y = 0$

x	y
-2	4
-1	2
0	1
1	1/2
2	1/4



3.  $y = 3^x$

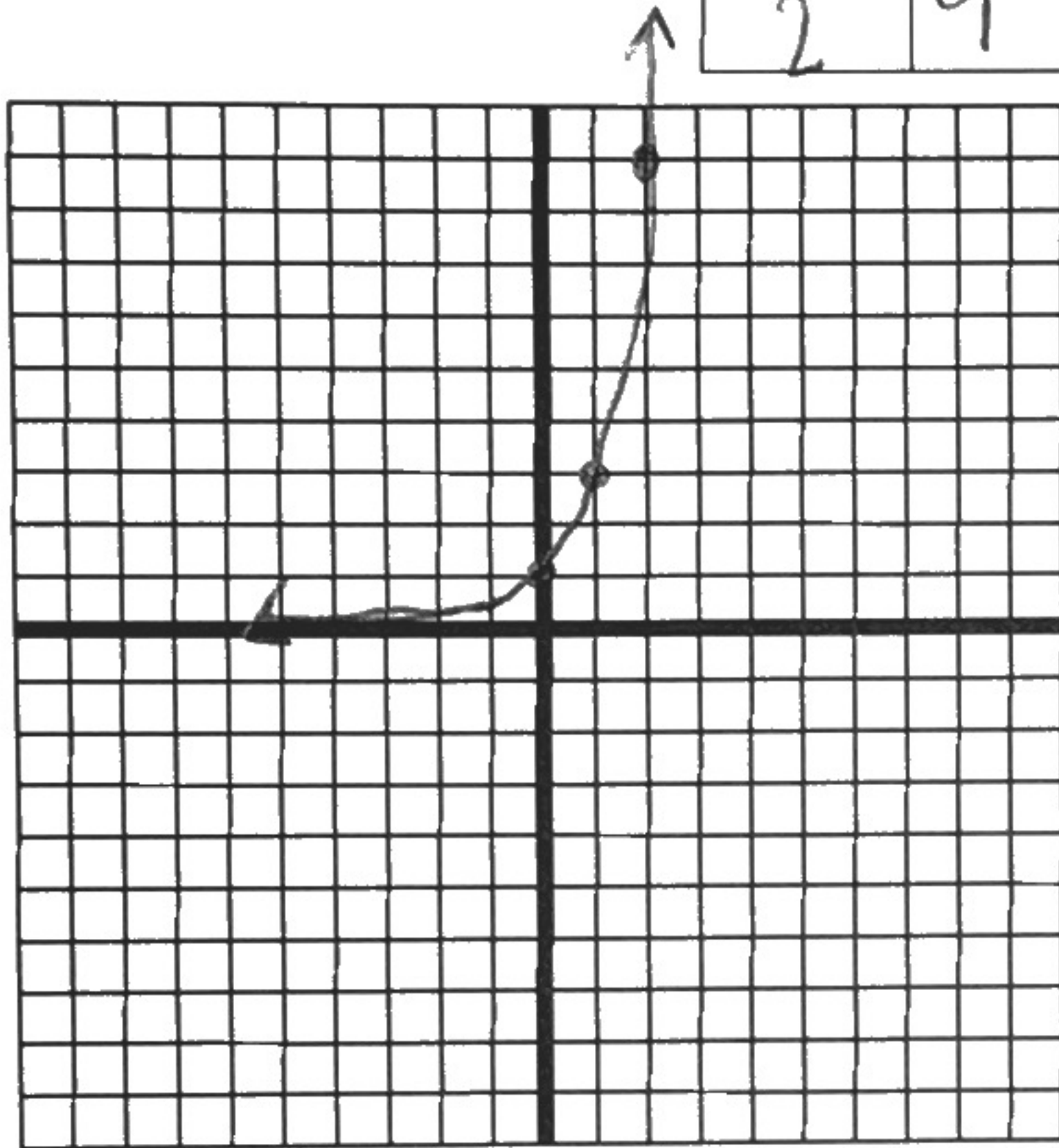
Growth or Decay?

growth

Asymptote:

$y = 0$

x	y
-2	0.111 ( $1/9$ )
-1	0.333 ( $1/3$ )
0	1
1	3
2	9



4.  $y = (\frac{2}{3})^x$

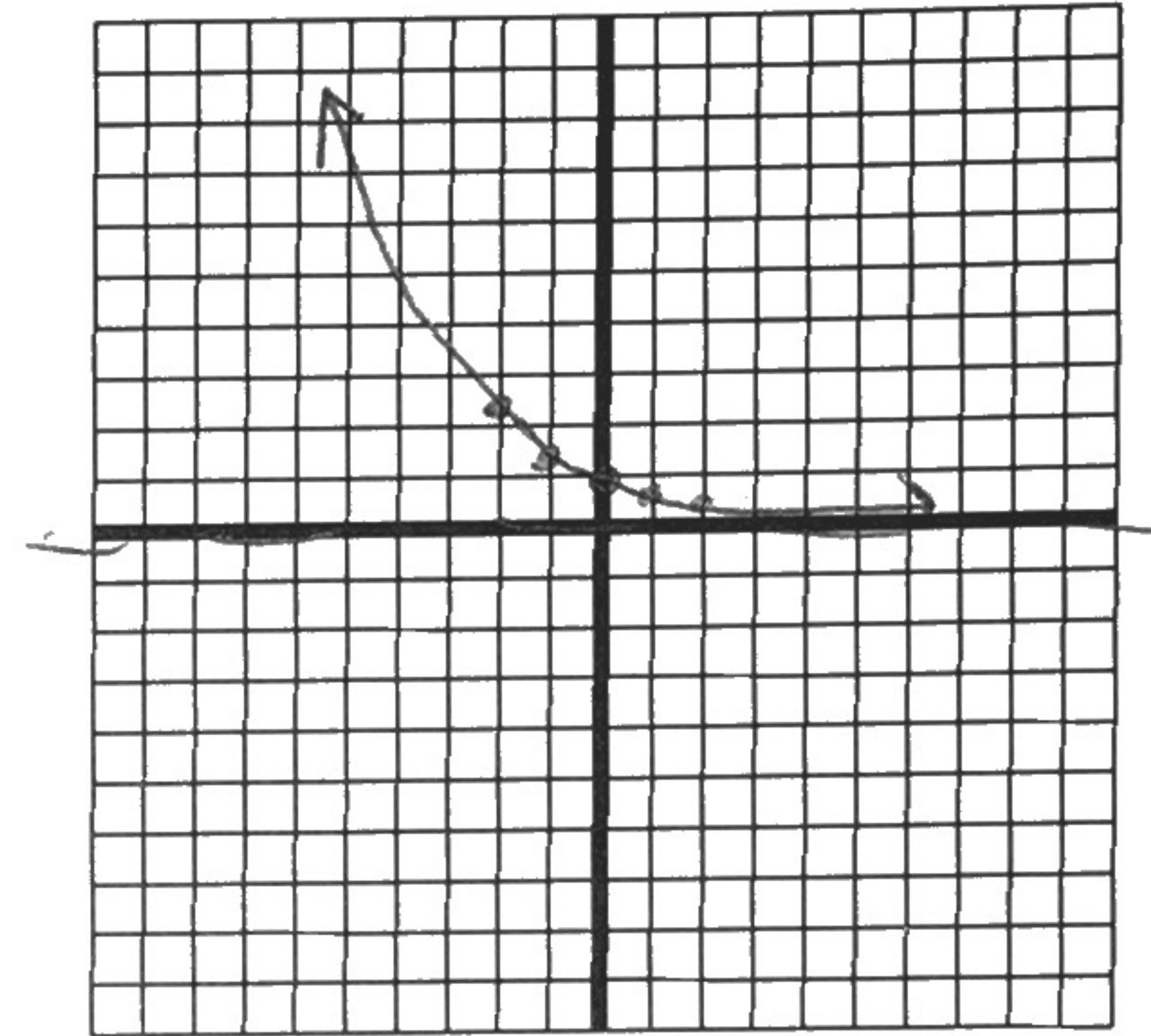
Growth or Decay?

decay

Asymptote:

$y = 0$

x	y
-2	2.25
-1	1.5
0	1
1	$2/3 = 0.667$
2	$4/9 = 0.444$



**Ticket Out The Door**

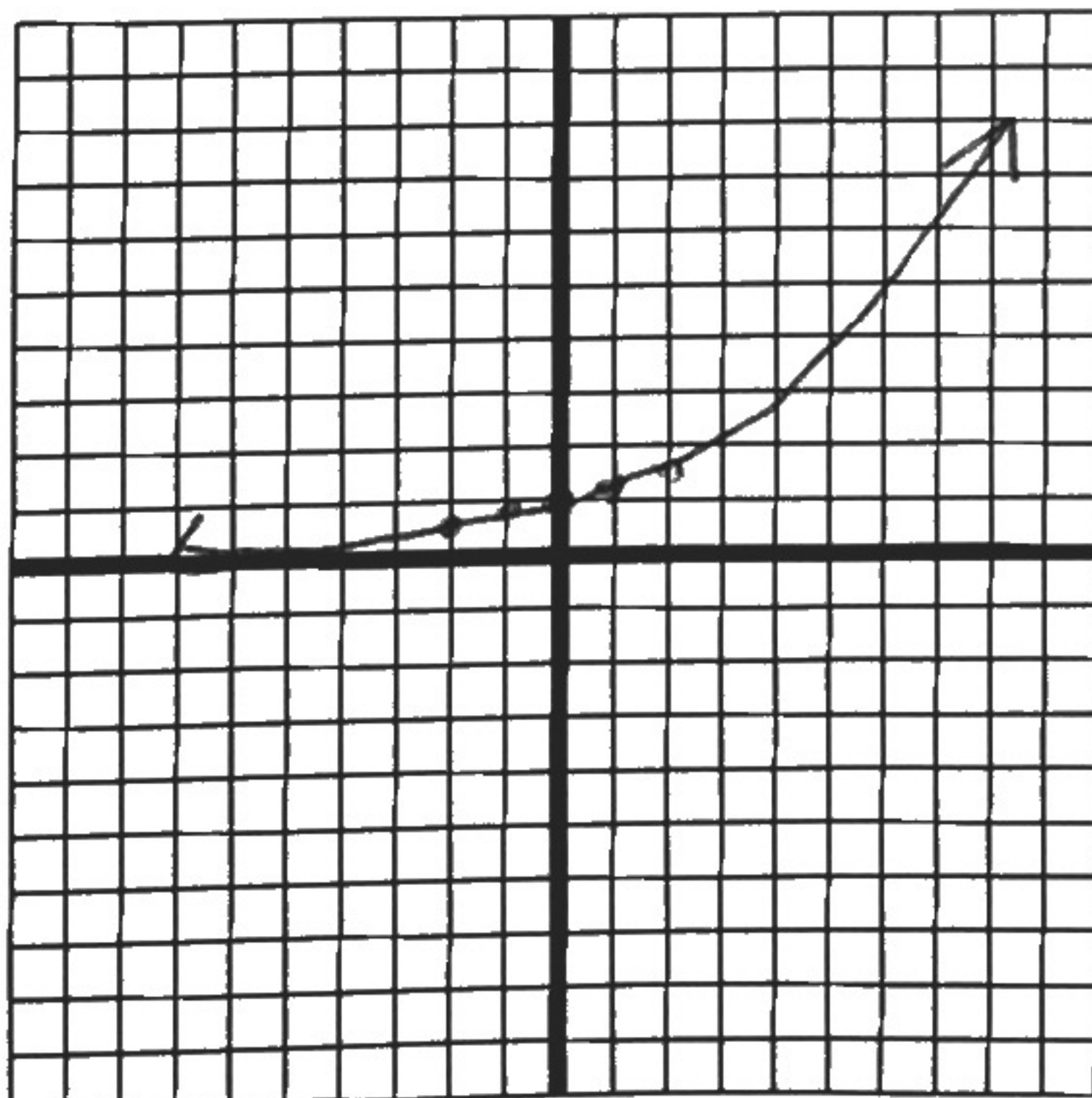
1.  $y = (\frac{5}{4})^x$

Growth or Decay?

Asymptote:

$y = 0$

x	y
-2	0.64
-1	0.8
0	1
1	1.25
2	1.5625



2. Determine whether these functions represent growth or decay.

a.  $y = 9^x$  growth

b.  $y = (\frac{1}{6})^x$  decay

**Homework:**

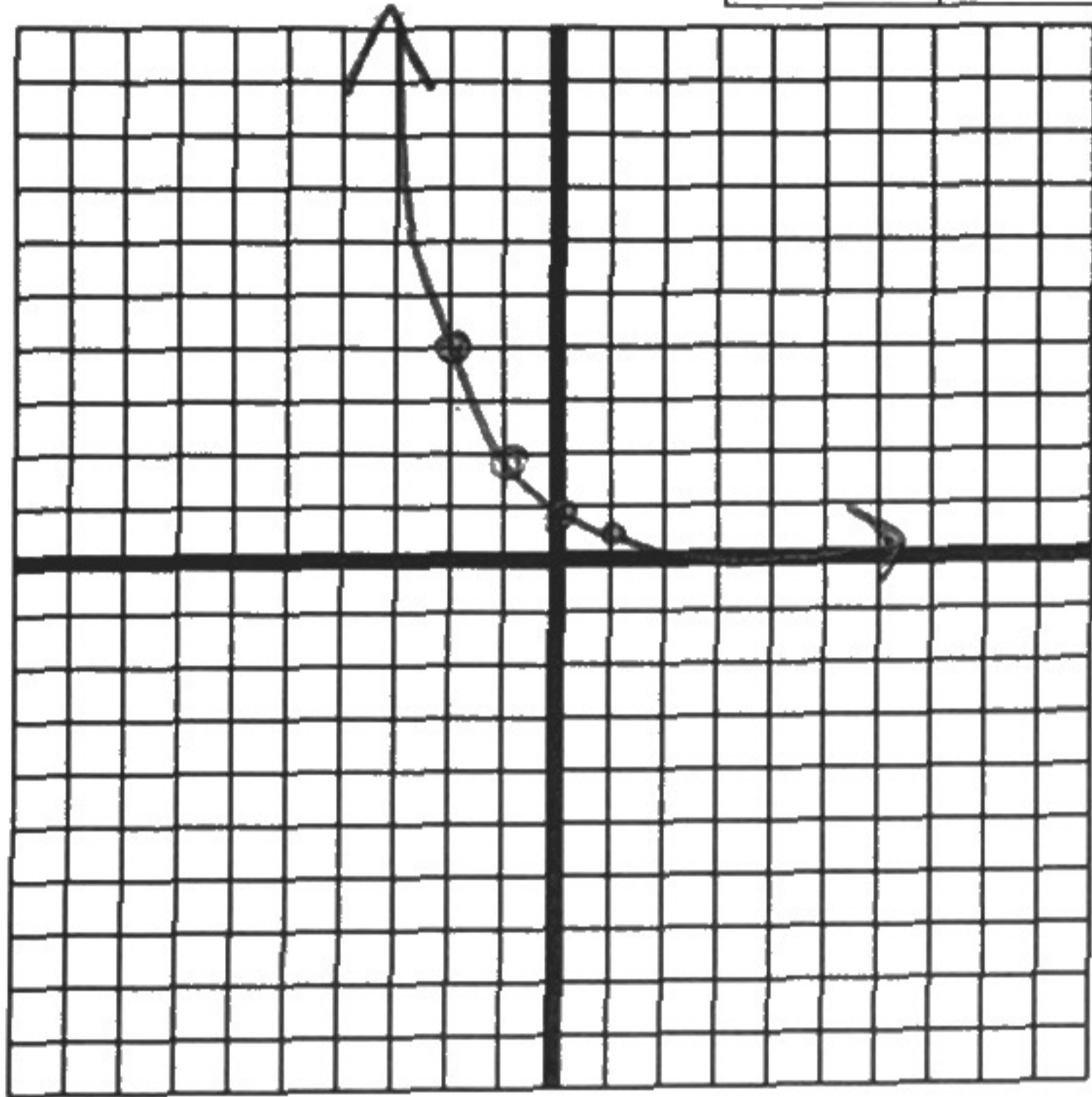
1.  $y = \left(\frac{1}{2}\right)^x$

Growth or Decay?

Asymptote:

$y = 0$

x	y
-2	4
-1	2
0	1
1	1/2
2	1/4



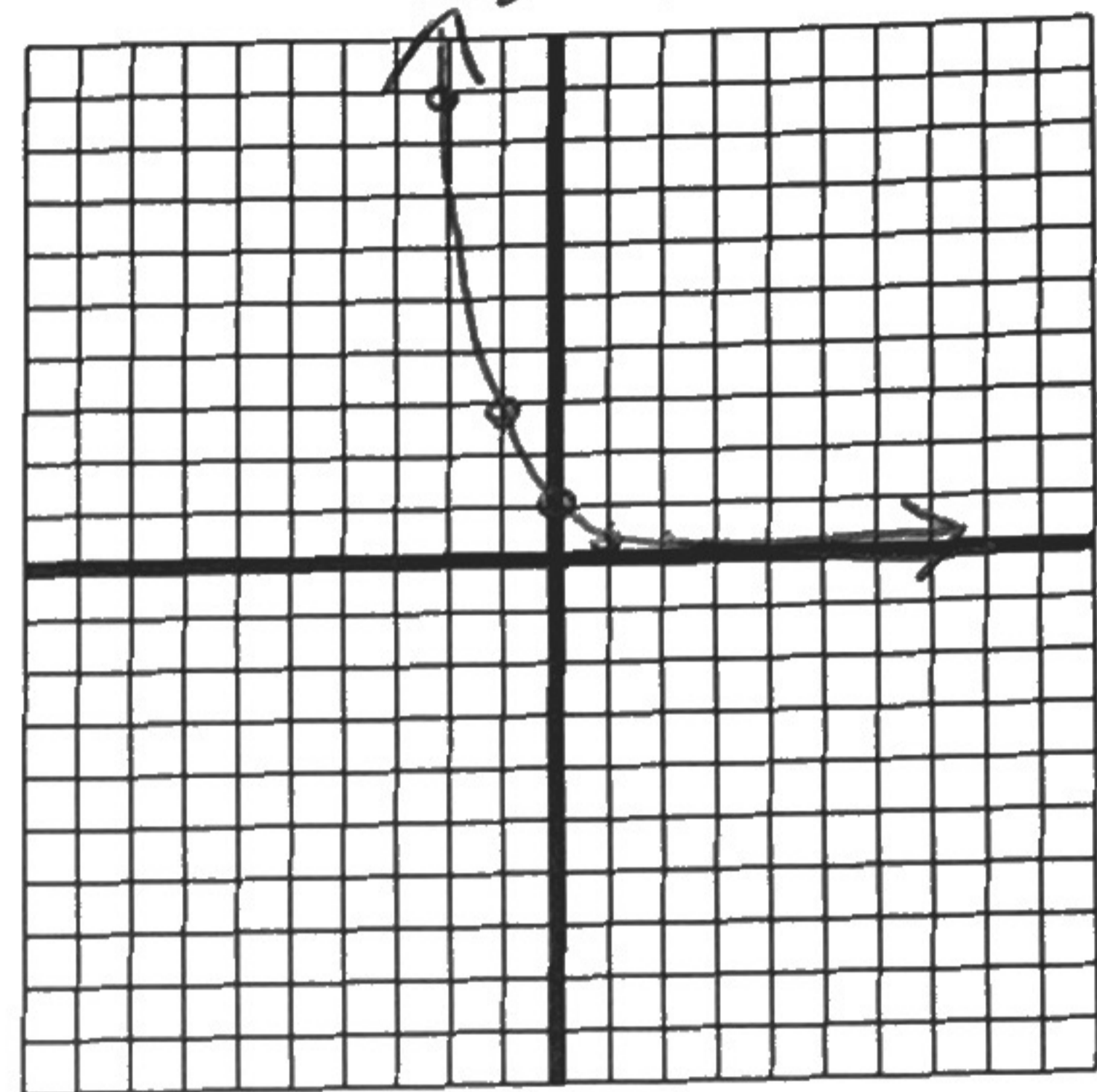
2.  $y = \left(\frac{1}{3}\right)^x$

Growth or Decay?

Asymptote:

$y = 0$

x	y
-2	9
-1	3
0	1
1	1/3
2	1/9



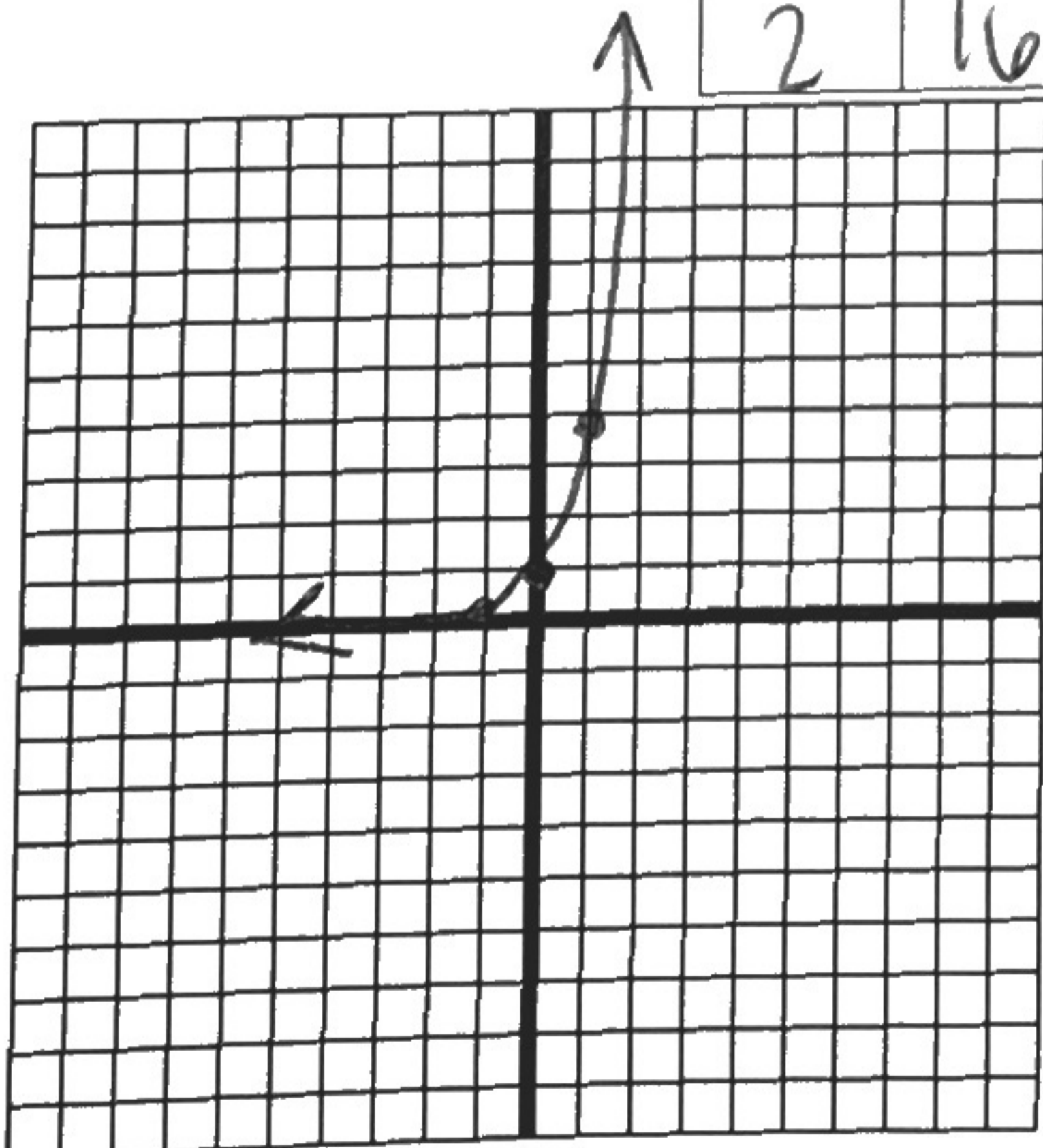
3.  $y = 4^x$

Growth or Decay?

Asymptote:

$y = 0$

x	y
-2	1/16
-1	1/4
0	1
1	4
2	16



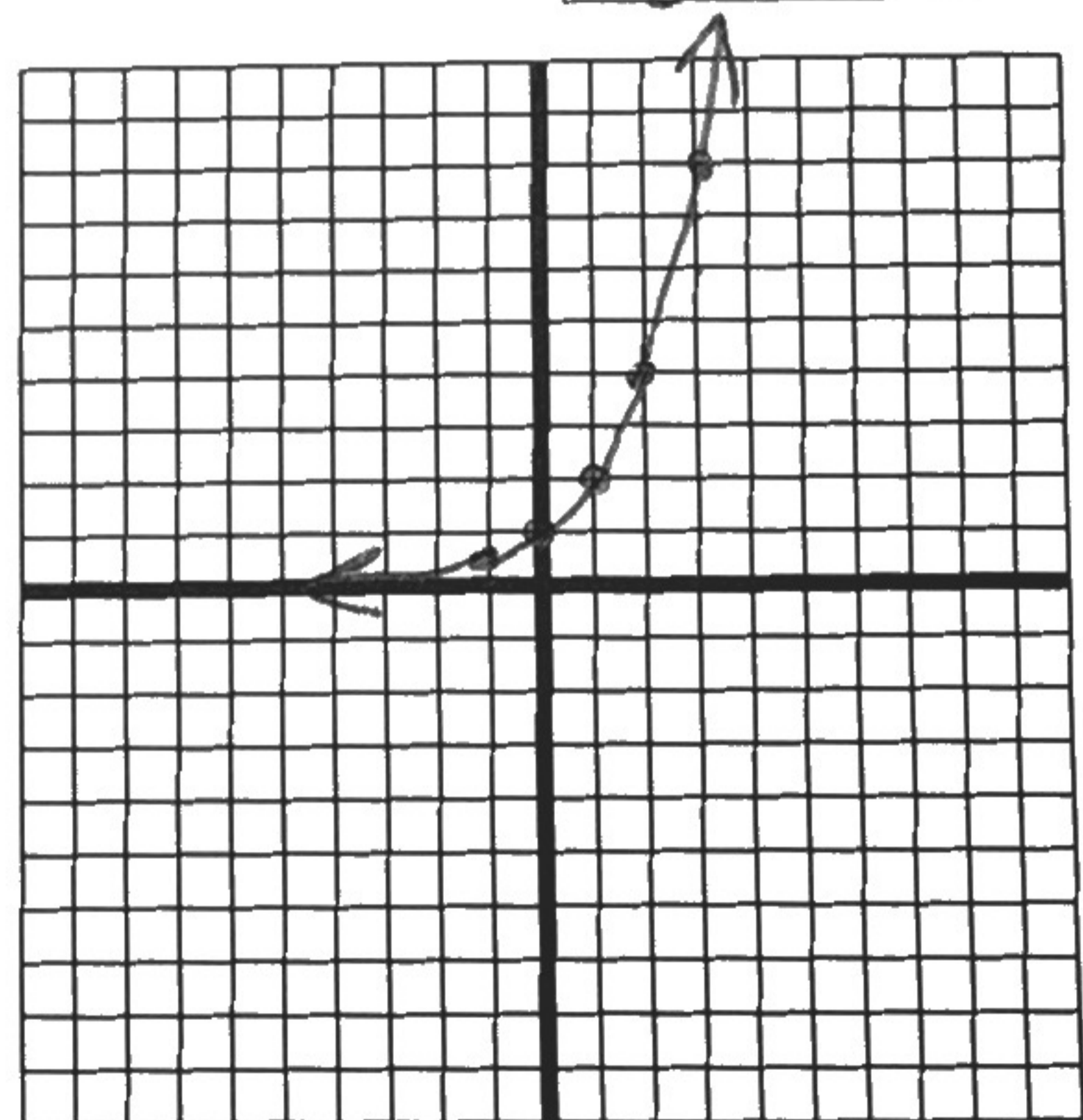
4.  $y = \left(\frac{6}{3}\right)^x$

Growth or Decay?

Asymptote:

$y = 0$

x	y
-2	1/4
-1	1/2
0	1
1	2
2	4



5.  $y = \left(\frac{3}{5}\right)^x$

Growth or Decay?

Asymptote:

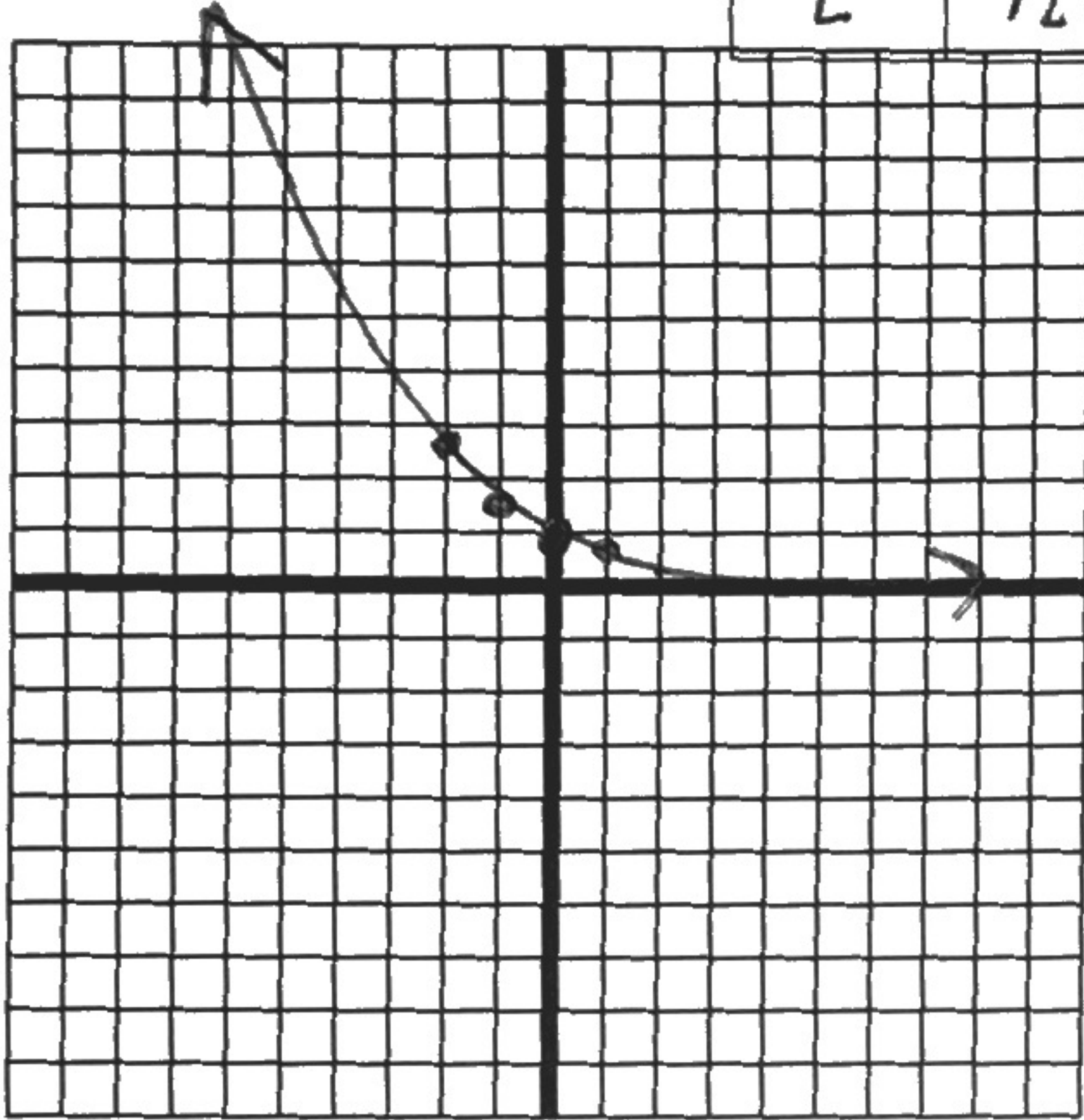
$y = 0$

x	y
-2	$25/9 = 2.\bar{7}$
-1	$5/3 = 1.\bar{6}$
0	1
1	$3/5 = 0.6$
2	$9/25 = 0.36$

Growth or Decay?

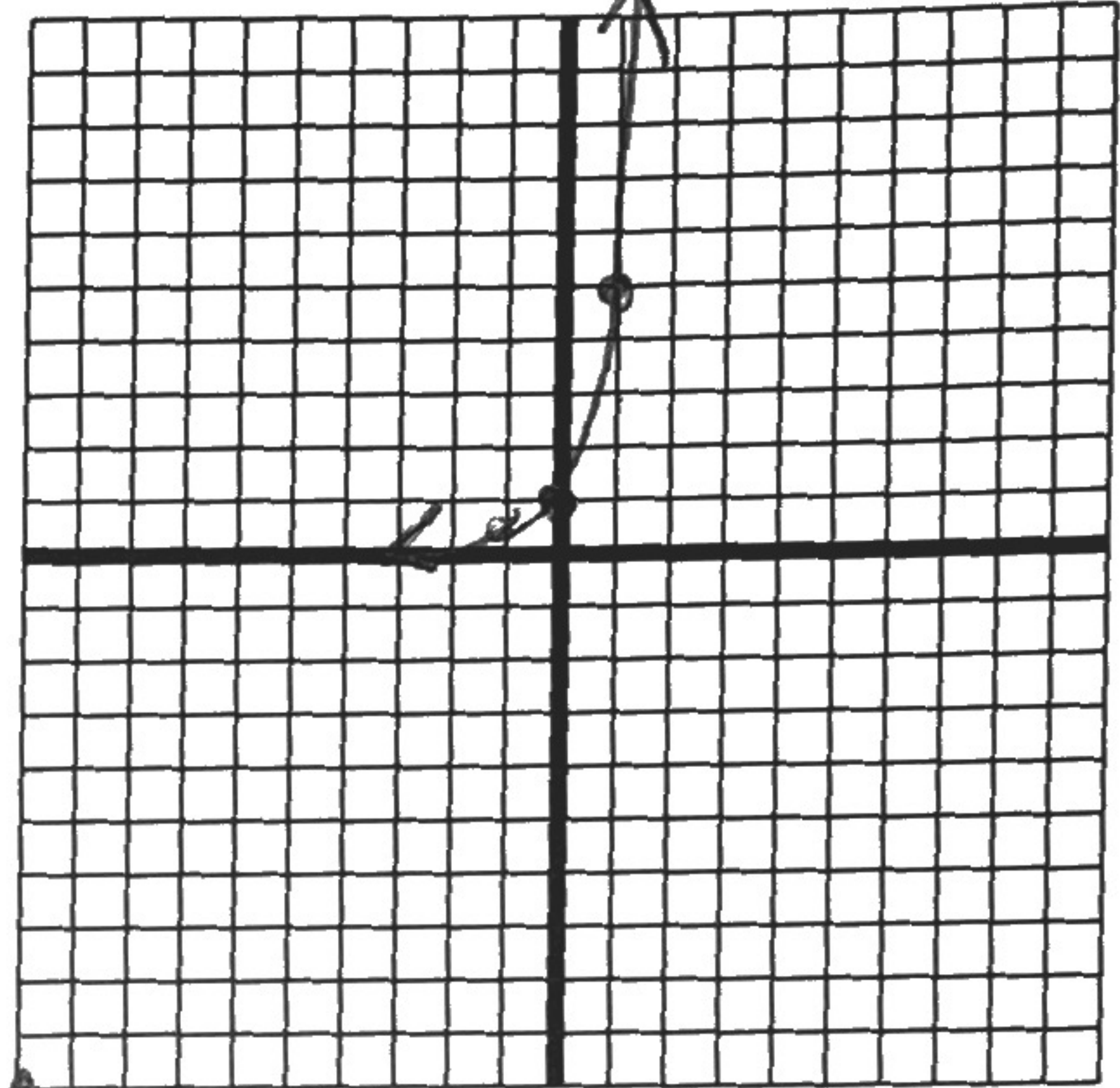
Asymptote:

$y = 0$



6.  $y = (5)^x$

x	y
-2	$1/25 = 0.04$
-1	$1/5 = 0.2$
0	1
1	5
2	25



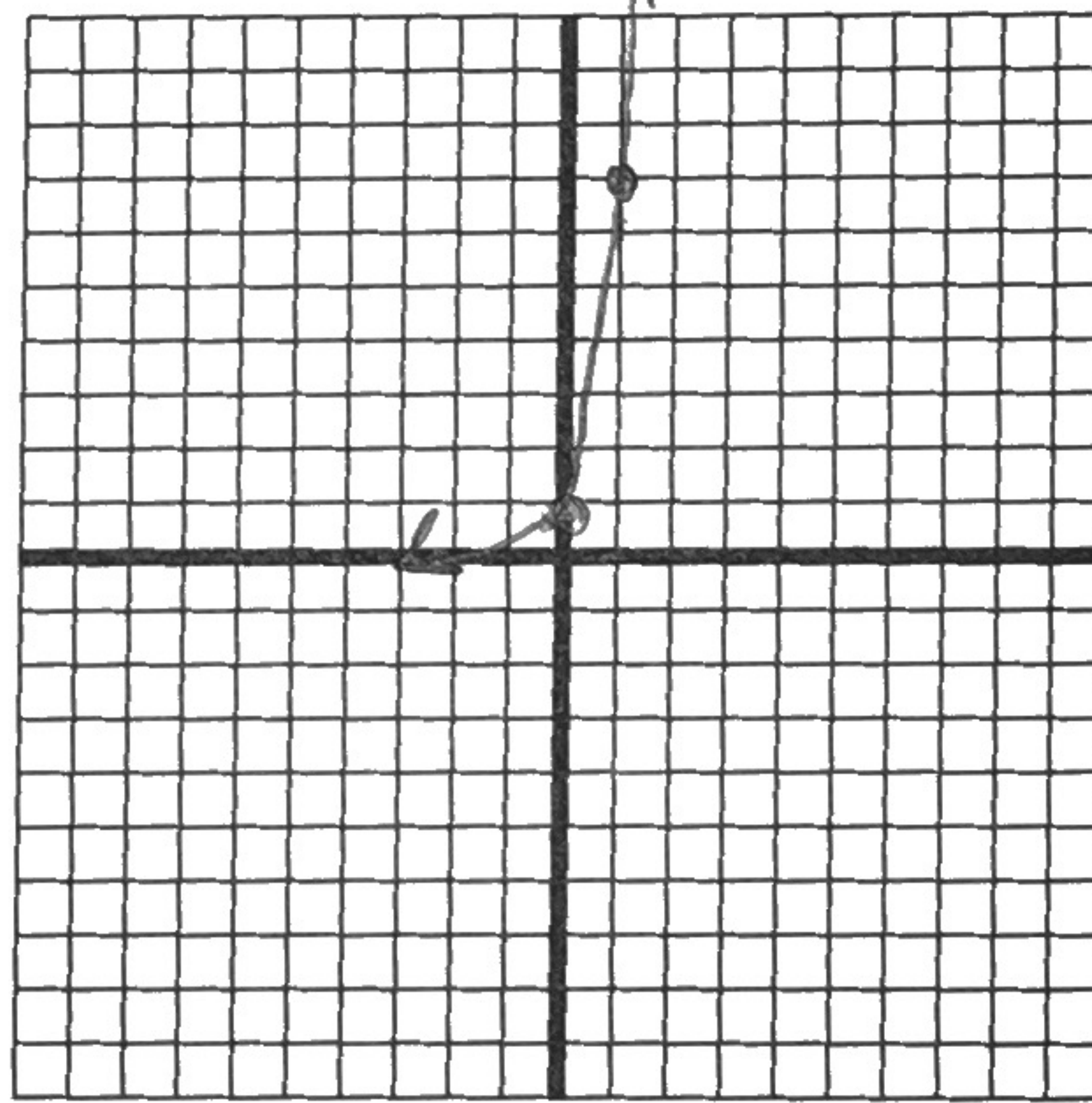
7.  $y = 7^x$

Growth or Decay?

Asymptote:

$y = 0$

x	y
-2	$1/49$
-1	$1/7$
0	1
1	7
2	49



Determine whether these exponential functions represent growth, decay, or neither.

8.  $y = 8^x$  growth

9.  $y = \left(\frac{4}{3}\right)^x$  growth

10.  $y = (2)^x$  growth

11.  $y = \left(\frac{1}{4}\right)^x$  decay

12.  $y = \left(\frac{5}{6}\right)^x$  decay

13.  $y = 4^x$  growth