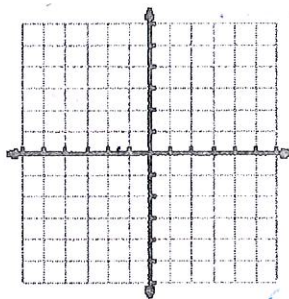


Exponential Functions:  $y = b^x$ , where  $b$  is a positive number other than 1

Graph  $y = 2^x$  using a t-chart.

X	Y



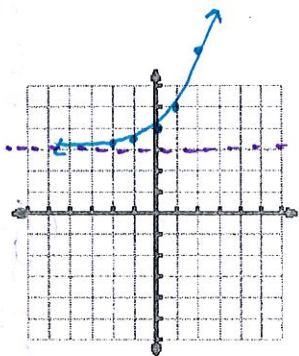
**Asymptote** - a line that a graph approaches as you move away from the origin; the graph hugs the asymptote

**General Exponential Function  $y = a(b^{x-h}) + k$**

- Sketch the horizontal asymptote with a dashed line ( $y = k$ )
- Find the y-intercept of the graph by evaluating the function when  $x=0$ .
- Use a t-chart to sketch the graph of  $y = ab^x$
- Transform the graph
  - Multiply y value of each coordinate in t-chart by a – move pencil to this point.
  - Shift h units horizontally
  - Shift k units vertically

1.  $y = 2^x + 3$

X	Y
-2	3.25
-1	3.5
0	4
1	5
2	7

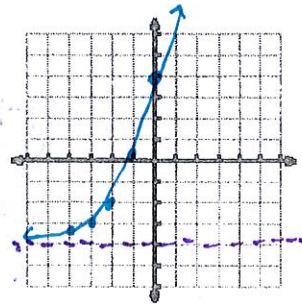


Y-intercept (0, 4)  
 Asymptote  $y = 3$   
 Domain  $(-\infty, \infty)$   
 Range  $(3, \infty)$

Growth or Decay  
 end behavior: as  $x \rightarrow -\infty$ ,  $y \rightarrow 3$   
as  $x \rightarrow \infty$ ,  $y \rightarrow \infty$

2.  $y = 2^{x+3} - 4$

X	Y
-4	-3.5
-3	-3
-2	-2
-1	0
0	4

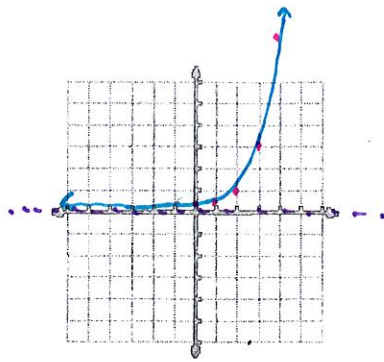


Y-intercept (0, 4)  
 Asymptote  $y = -4$   
 Domain  $(-\infty, \infty)$   
 Range  $(-4, \infty)$

Growth or Decay  
 end behavior: as  $x \rightarrow -\infty$ ,  $y \rightarrow -4$   
as  $x \rightarrow \infty$ ,  $y \rightarrow \infty$

3.  $y = 3^{x-2}$

X	Y
0	.11
1	.33
2	1
3	3
4	9



Y-intercept  $(0, 0.11)$

Asymptote  $y = 0$

Domain  $(-\infty, \infty)$

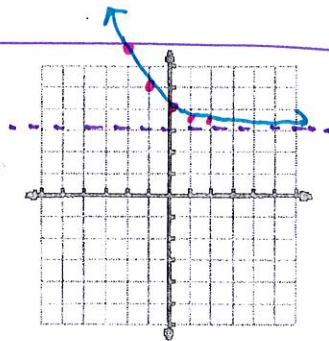
Range  $(0, \infty)$

Growth or Decay

end behavior:  $\text{as } x \rightarrow -\infty, y \rightarrow 0$   
 $\text{as } x \rightarrow \infty, y \rightarrow \infty$

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

X	Y
-2	7
-1	5
0	4
1	3.5
2	3.25



Y-intercept  $(0, 4)$

Asymptote  $y = 3$

Domain  $(-\infty, \infty)$

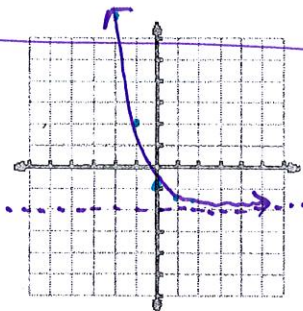
Range  $(3, \infty)$

Growth or Decay

end behavior:  $\text{as } x \rightarrow -\infty, y \rightarrow \infty$   
 $\text{as } x \rightarrow \infty, y \rightarrow 3$

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

X	Y
-1	
0	
1	
2	
3	



Y-intercept  $(0, -1)$

Asymptote  $y = -2$

Domain  $(-\infty, \infty)$

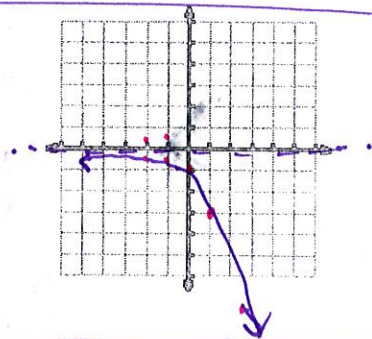
Range  $(-2, \infty)$

Growth or Decay

end behavior:  $\text{as } x \rightarrow -\infty, y \rightarrow \infty$   
 $\text{as } x \rightarrow \infty, y \rightarrow -2$

6.  $y = -(3)^x$

X	Y
-2	-.11
-1	-.33
0	-1
1	-3
2	-9



Y-intercept  $(0, -1)$

Asymptote  $y = 0$

Domain  $(-\infty, \infty)$

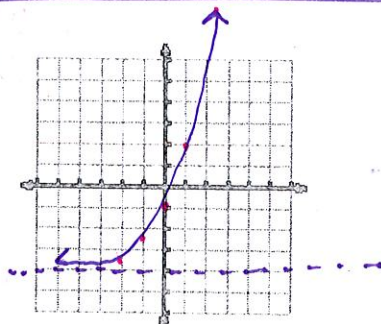
Range  $(-\infty, 0)$

Growth or Decay

end behavior:  $\text{as } x \rightarrow -\infty, y \rightarrow 0$   
 $\text{as } x \rightarrow \infty, y \rightarrow -\infty$

7.  $y = 3 \cdot (2)^x - 4$

X	Y
-2	-3.25
-1	-2.5
0	-1
1	2
2	8



Y-intercept  $(0, -1)$

Asymptote  $y = -4$

Domain  $(-\infty, \infty)$

Range  $(-4, \infty)$

Growth or Decay

end behavior:  $\text{as } x \rightarrow -\infty, y \rightarrow -4$   
 $\text{as } x \rightarrow \infty, y \rightarrow \infty$