

Section 7.2: Transformations of Exponential Functions

$$y = c^x$$

$c > 1 \Rightarrow$  exponential growth

$0 < c < 1 \Rightarrow$  exponential decay

$$y = a(c)^{b(x-h)} + k$$

vertical stretch factor  $\uparrow$   $a$   
 horizontal stretch  $\uparrow$   $|b|$   
 horizontal translation  $\uparrow$   $h$   
 vertical translation / horizontal asymptote  $\uparrow$   $k$

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

Base function

$$y = 3^x$$

mapping  $(x,y) \rightarrow (\frac{1}{5}x, -\frac{1}{2}y - 5)$

x	y
-5	1/9
-1	1/3
0	1
1	3
2	9

focal point

x	y
-10	-9 1/18
-5	-3 1/6
0	-1 1/2
5	-13/2
10	-19/2

\* decimals to graph

pg. 351

Domain:  $x | x \in \mathbb{R}$

Range:  $y < -5, y \in \mathbb{R}$

equation of asymptote  $\Rightarrow y = -5$

ex.2)  $y = 3\left(\frac{1}{2}\right)^{\frac{1}{5}x-4} + 1$

mapping  $(x,y) \rightarrow (2x+8, 3y+1)$

Range  $y > 1, y \in \mathbb{R}$

focal point

y-intercept  $(0,1) \rightarrow (8,4)$

mapping rule  $y = 3\left(\frac{1}{2}\right)^{\frac{1}{2}(x-8)} + 1$

let  $x=0$

$$y = 3\left(\frac{1}{2}\right)^{\frac{1}{2}(0-8)} + 1$$

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

$$= 3(16) + 1$$

$$= 49$$

pg. 355  
#4, #6