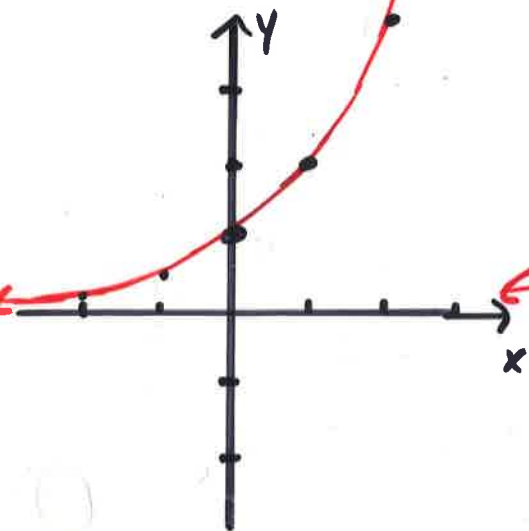


## 7.2 PROPERTIES OF EXPONENTIAL FUNCTIONS

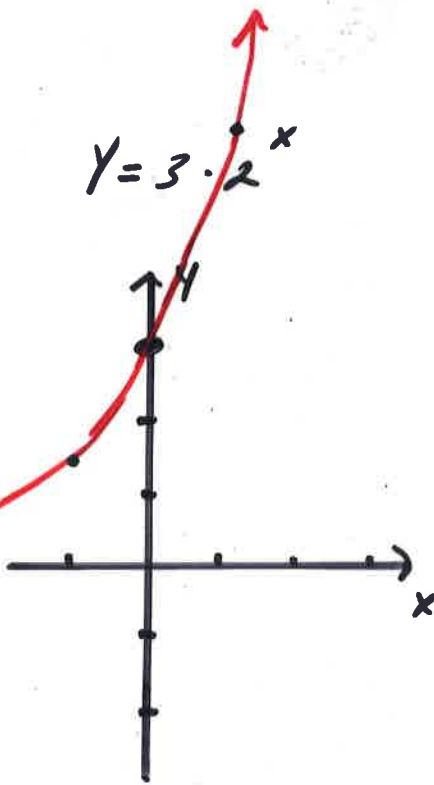
CONSIDER

$$y = 2^x$$



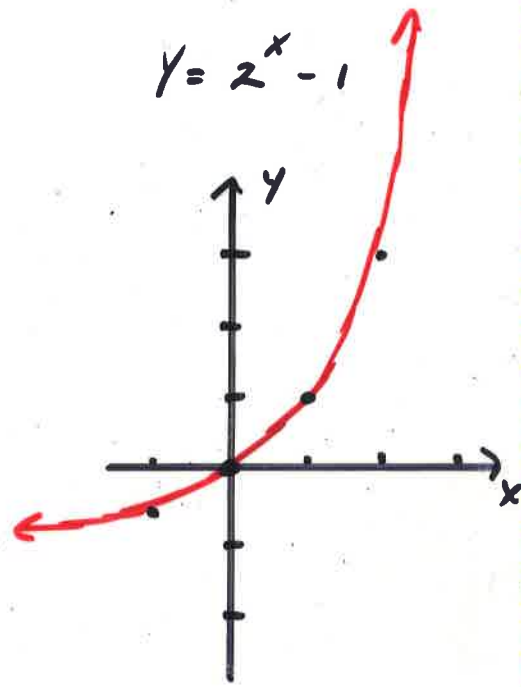
PARENT GRAPH  
 $y = b^x$

$$y = 3 \cdot 2^x$$



STRETCH  
 $y = a b^x$   
 $|a| > 1$

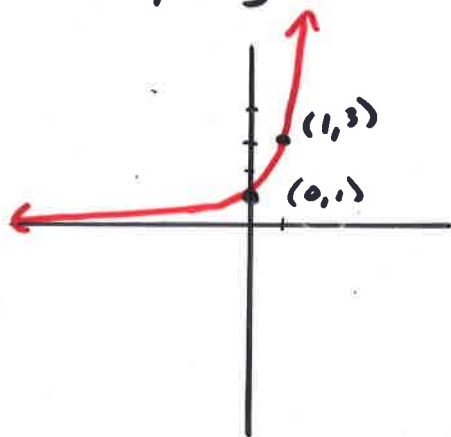
$$y = 2^x - 1$$



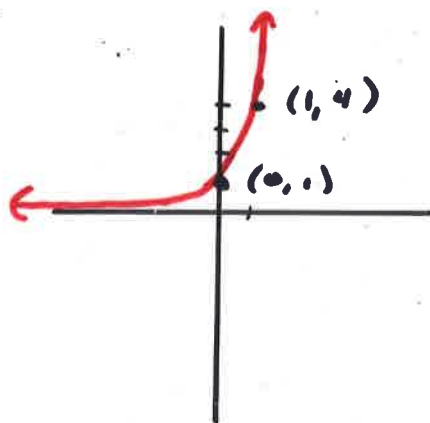
TRANSLATION  
DOWN BY 1

ALSO CONSIDER

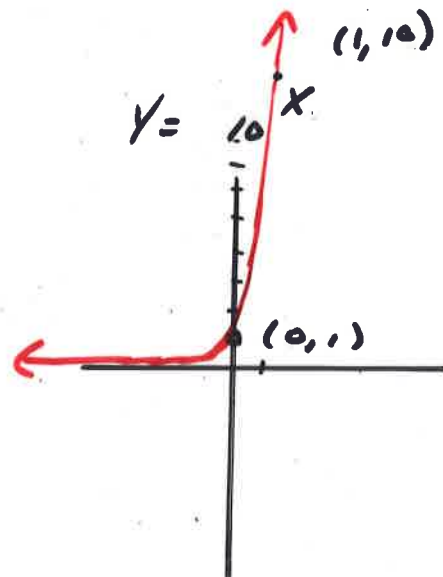
$$y = 3^x$$



$$y = 4^x$$



$$y = 10^x$$



# SUMMARY OF PARENT FUNCTION $y = b^x$

STRETCH  $|a| > 1$

SHRINK  $0 < |a| < 1$

X-AXIS REFLECTION  $a < 0$

$$\left. \begin{array}{l} \text{STRETCH } |a| > 1 \\ \text{SHRINK } 0 < |a| < 1 \\ \text{X-AXIS REFLECTION } a < 0 \end{array} \right\} y = a b^x$$

## TRANSLATION

$h$  : horizontal

$k$  : vertical

$$\left. \begin{array}{l} \text{TRANSLATION} \\ \text{h : horizontal} \\ \text{k : vertical} \end{array} \right\} y = b^{x-h} + k$$

## COMBINED

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

EX: GRAPH  $y = 4^{x-2} + 3$

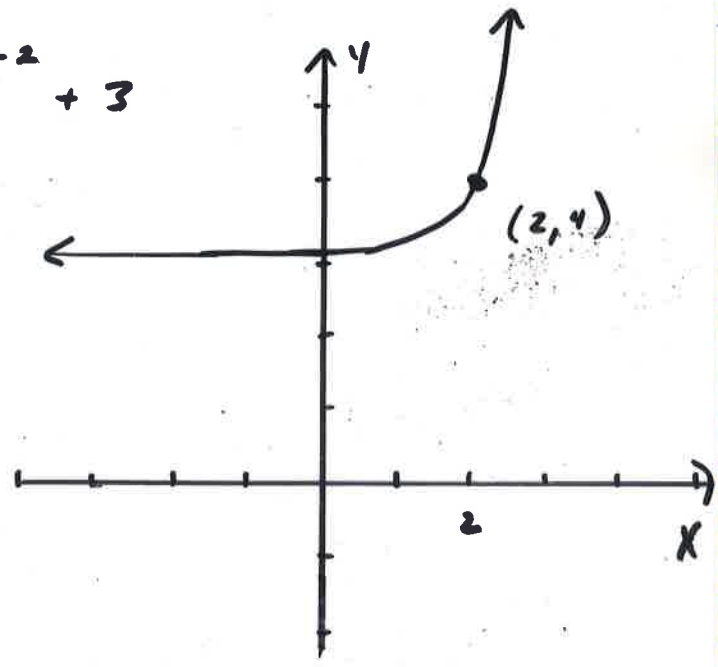
SHIFT RIGHT 2

UP 3

START AT  $(0, 1)$

SINCE  $y = 4^x$  GOES

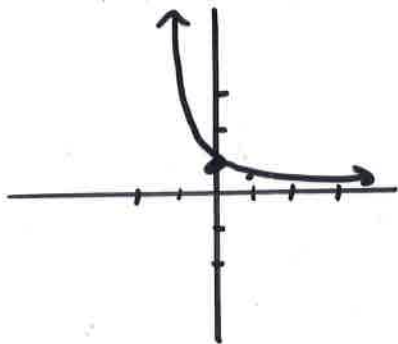
THROUGH  $(0, 1)$ .



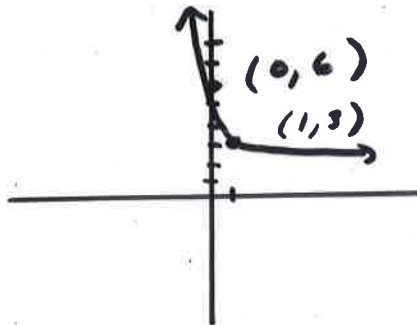
NOTE: THE HORIZONTAL ASYMPTOTE IS  $y = 3$ .

EX: GRAPH  $Y = 6\left(\frac{1}{2}\right)^{x-3} - 2$

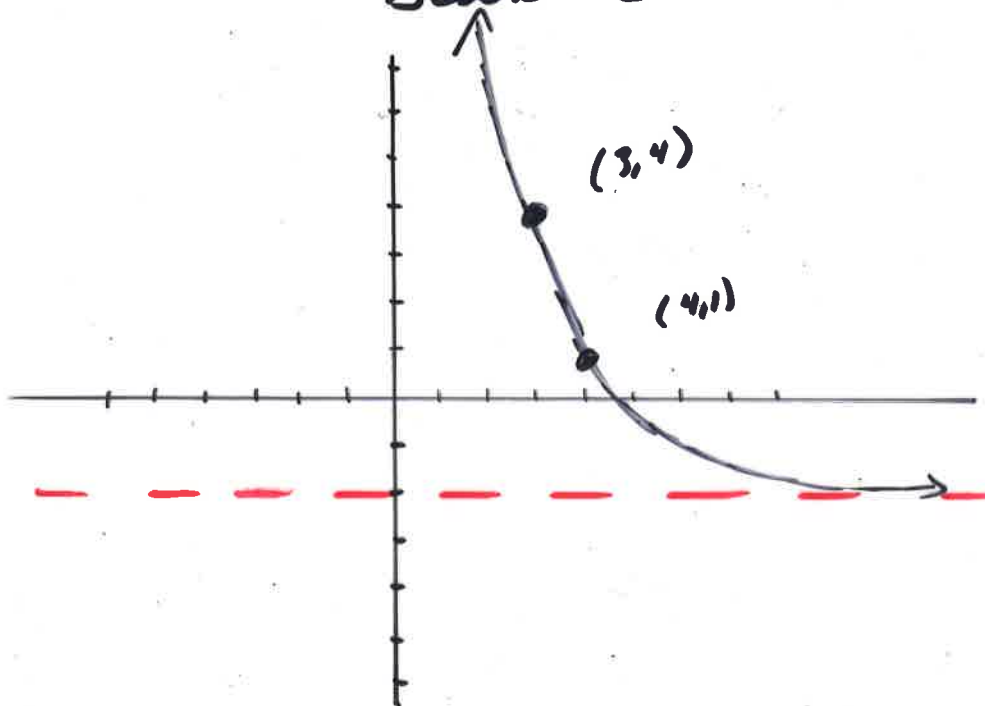
$$Y = \left(\frac{1}{2}\right)^x$$



$$Y = 6\left(\frac{1}{2}\right)^x$$



NOW, SHIFT RIGHT 3  
DOWN 2



APPLICATION: CONTINUOUS COMPOUNDED INTEREST

$$A = Pe^{rt}$$