
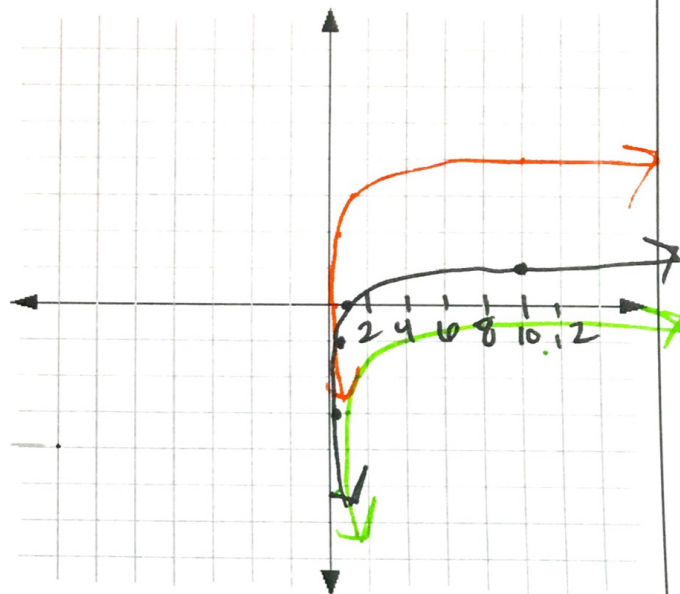

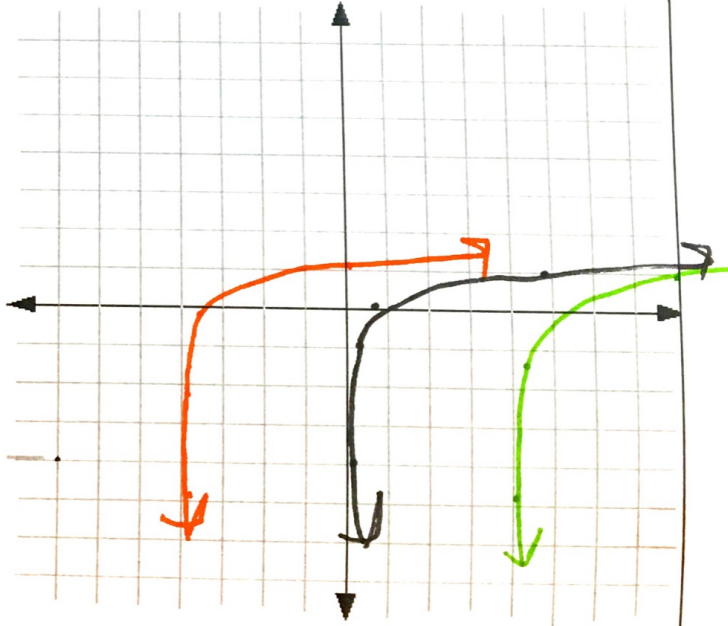


## Transformations of Logarithmic Functions

	Transformation	Graph
$f(x) = \log(x) + k$  Vertical Shift 	If $k$ is positive <u>Shift up <math>k</math> units</u>  If $k$ is negative <u>Shift down <math>k</math> units</u>	
$f(x) = \log(x + h)$  Horizontal Shift 	If $h$ is positive <u>Shift left <math>h</math> units</u>  If $h$ is negative <u>Shift right <math>h</math> units</u>	

Parent function:  $y = \log_{10}(x)$   
 $y = \log(x)$

X	Y
$\frac{1}{1000}$	-3
$\frac{1}{10}$	-1
1	0
10	1

$$f(x) = a \log(x)$$

Vertical  
Stretch  
or  
Compression

If  $a$  is bigger than 1

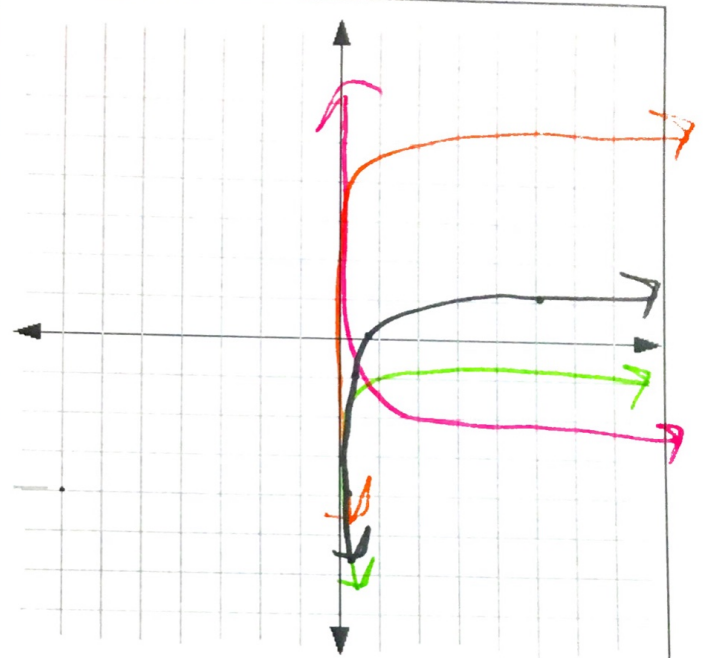
Stretch

If  $a$  is between 0 and 1

Compress

If  $a$  is negative

~~reflect across  
the x-axis~~



$$f(x) = \log(ax)$$

Horizontal  
Stretch  
or  
Compression

If  $a$  is bigger than 1

Compress

If  $a$  is between 0 and 1

Stretch

If  $a$  is negative

~~reflect on  
the y-axis~~

