

1.  $y = 8^x$  so  $f(x) = 8^x$

a)  $y = (\frac{1}{2})8^x$   
 $y = \frac{1}{2}f(x)$

Vertical Compression factor  $\frac{1}{2}$

b)  $y = 8^{4x}$   
 $y = f(4x)$

Horizontal Compression factor  $\frac{1}{4}$

c)  $y = -8^x$   
 $y = -f(x)$

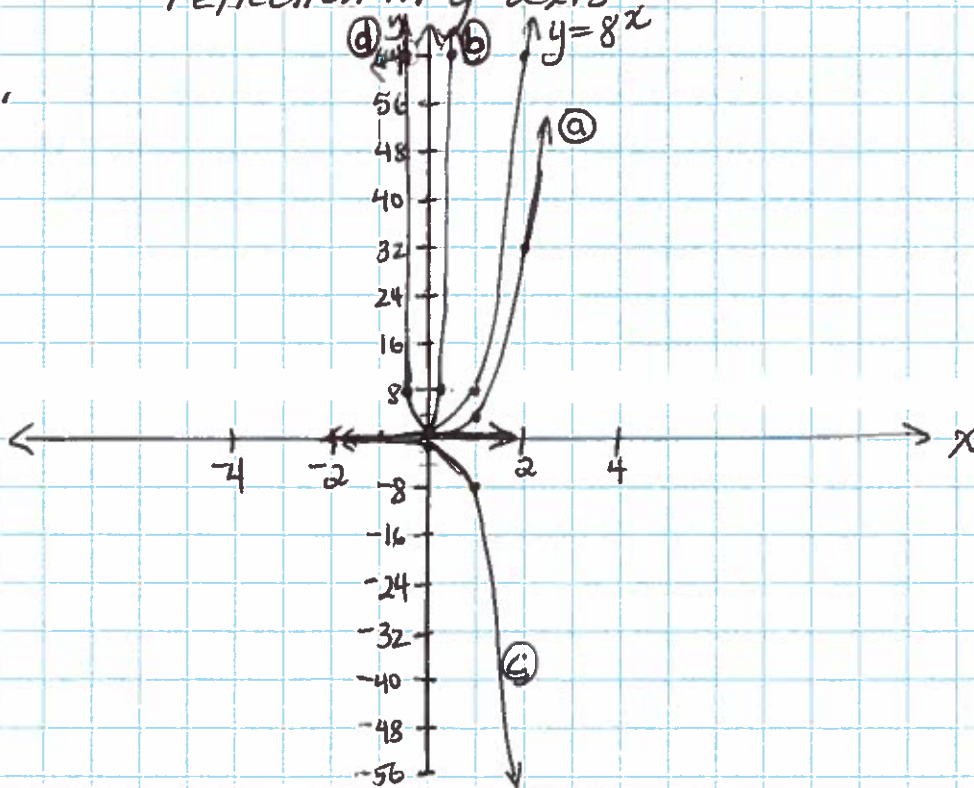
reflection in x-axis

d)  $y = 8^{-2x}$

$y = f(-2x)$

↑ Horizontal Compression factor  $\frac{1}{2}$   
 ↑ reflection in y-axis

2.



3.  $y = 7^x$  so  $f(x) = 7^x$

a) reflect in x-axis  $y = -7^x$

b) stretch vertically factor 3  $y = 3f(x)$

$$y = 3(7^x)$$

c) stretch horizontally factor 2.4  $y = f\left(\frac{1}{2.4}x\right)$

$$y = 7^{\frac{1}{2.4}x}$$

$$y = 7^{5x/12}$$

$$\frac{1}{2.4} = \frac{10}{24} = \frac{5}{12}$$

d) reflect in y-axis  
vertical compression factor 7  
 $\left(\frac{1}{7}x\right)$

$$y = \frac{1}{7}f(-x)$$

$$y = \frac{1}{7}(7^{-x})$$

$$y = 7^{-1}(7^{-x})$$

$$y = 7^{-1+(-x)}$$

$$y = 7^{-x-1}$$

$$\text{OR } y = 7^{-(x+1)}$$

\* same base  
...  
may  
be  
simplified.

4.  $y = 2^x$

$$f(x) = 2^x$$

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

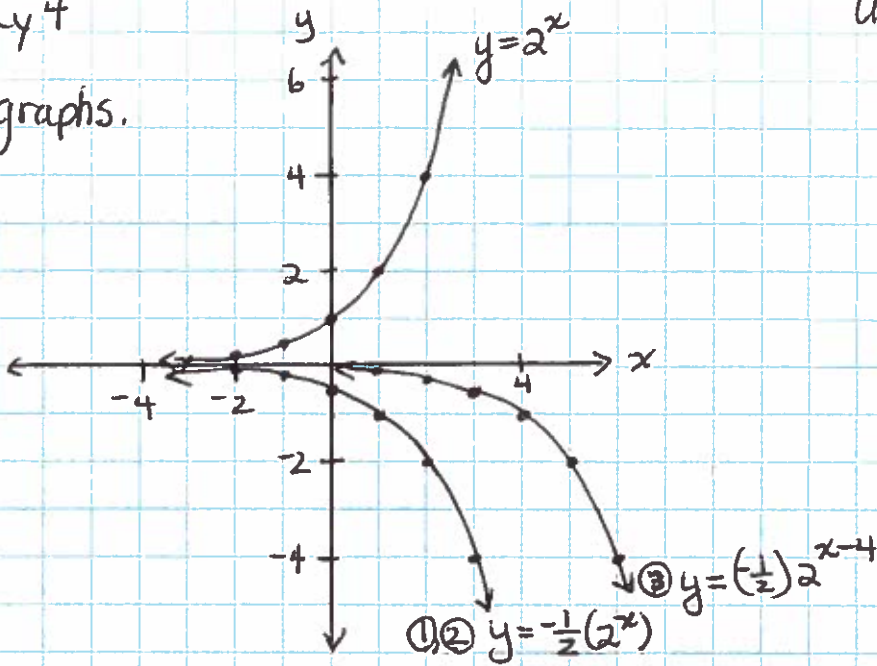
$$y = -\frac{1}{2}f(x-4)$$

↳ shift right 4 (3)  
↳ vertically compress factor  $\frac{1}{2}$  (2)  
↳ reflect in x-axis (1)

\* must do shift after reflection, compression.

\* Graphs next page

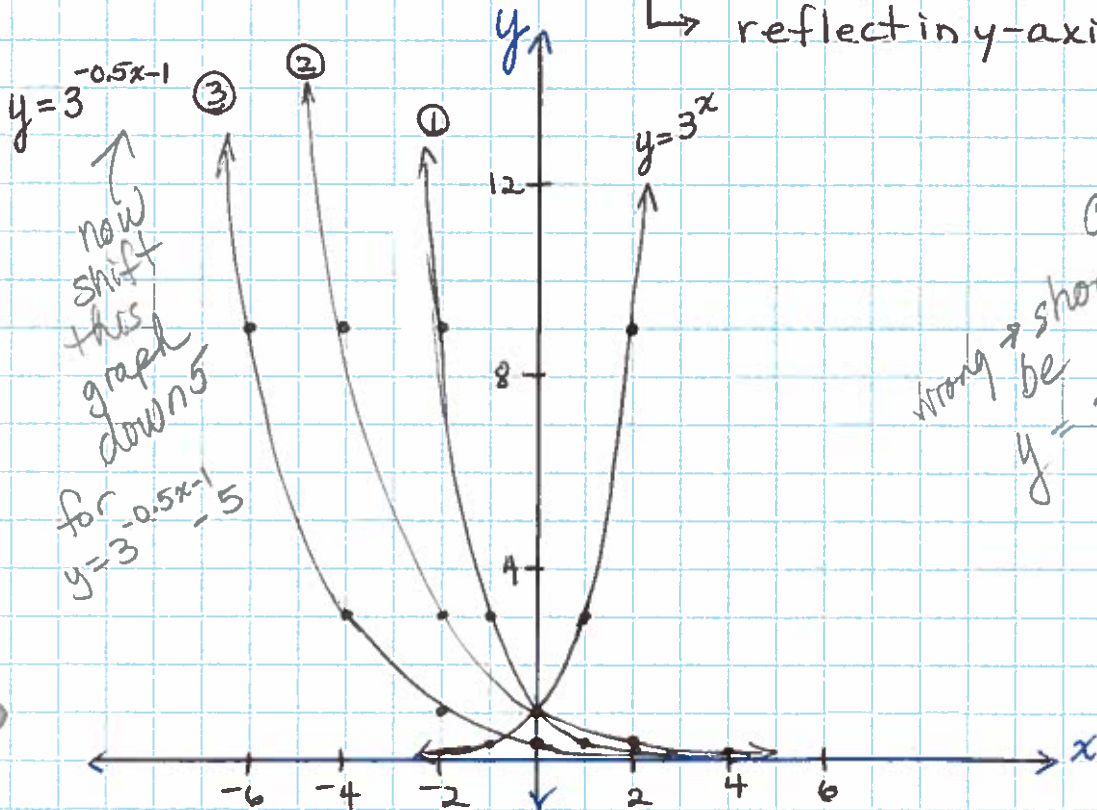
4. graphs.



5.  $y = 3^x$ ,  $y = 3^{-0.5x-1}$   
 $y = f(x)$ ,  $y = 3^{-\frac{1}{2}(x+2)}$

$y = f(-\frac{1}{2}(x+2))$

- ↳ shift left 2 ③
- ↳ horizontal stretch factor 2 ②
- ↳ reflect in y-axis ①

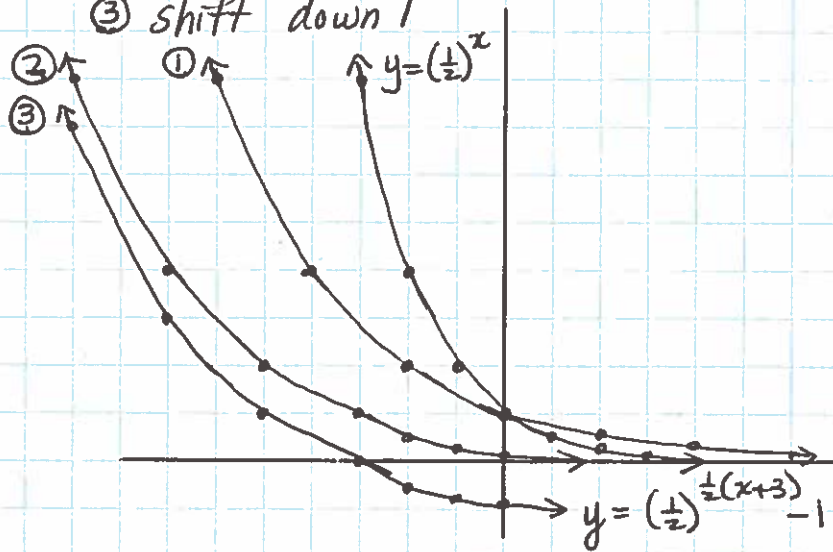


Ops, Copied down  
 wrong → should be  $y = 3^{-\frac{1}{2}(x+2)}$   
 $\frac{-5}{-5}$   
 down 5 units

6.a) Graph  $f(x) = \left(\frac{1}{2}\right)^{\frac{1}{2}(x+3)} - 1$  using transformations.

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

- ① horizontal stretch factor 2
- ② shift left 3
- ③ shift down 1



b) (i) Domain =  $\{x \in \mathbb{R}\}$

(ii) Range =  $\{y \in \mathbb{R} \mid y > -1\}$

(iii) Asymptote  $y = -1$