

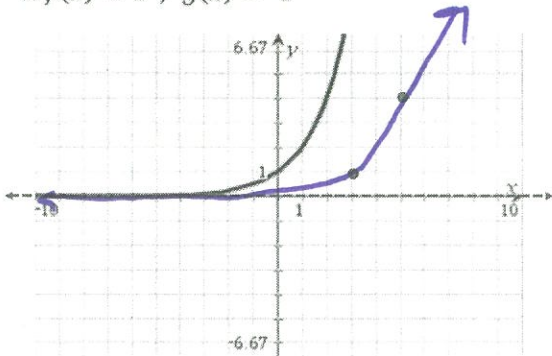
HPC/RPC  
 Transformations of Exponential  
 & Logarithmic Functions

Name: KEY  
 Date: \_\_\_\_\_ Period: \_\_\_\_\_

Describe how to transform the graph of  $f$  into the graph of  $g$ , and list the Domain, Range,  $y$ -intercept, asymptote and end behavior for the transformed function. Then sketch the graph of  $g$  onto the coordinate grid (which shows the graph of  $f$  already).

1.  $f(x) = 2^x, g(x) = 2^{x-3}$

Right 3  
 $(x+3, y)$



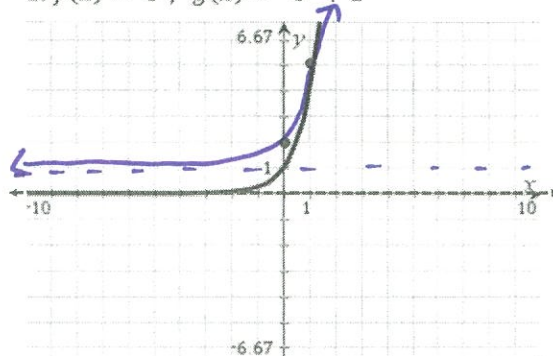
Domain:  $(-\infty, \infty)$  Range:  $(0, \infty)$

$y$ -intercept:  $(0, 1/8)$  Asymptote:  $y = 0$

End Behavior: As  $x \rightarrow -\infty, f(x) \rightarrow 0$   
 As  $x \rightarrow \infty, f(x) \rightarrow \infty$

2.  $f(x) = 4^x, g(x) = 4^x + 1$

up 1  
 $(x, y+1)$



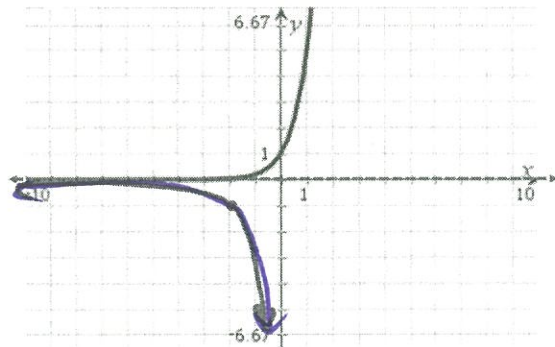
Domain:  $(-\infty, \infty)$  Range:  $(1, \infty)$

$y$ -intercept:  $(0, 2)$  Asymptote:  $y = 1$

End Behavior: As  $x \rightarrow -\infty, f(x) \rightarrow 1$   
 As  $x \rightarrow \infty, f(x) \rightarrow \infty$

3.  $f(x) = 5^x, g(x) = -5^{x+2}$

Reflect over  $x$   
 Left 2  
 $(x-2, -y)$



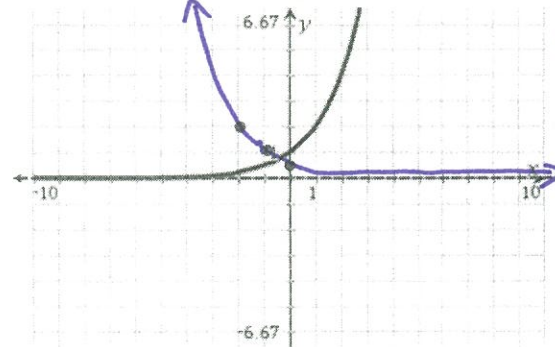
Domain:  $(-\infty, \infty)$  Range:  $(-\infty, 0)$

$y$ -intercept:  $(0, -25)$  Asymptote:  $y = 0$

End Behavior: As  $x \rightarrow -\infty, f(x) \rightarrow 0$   
 As  $x \rightarrow \infty, f(x) \rightarrow -\infty$

4.  $f(x) = 2^x, g(x) = 0.5 \cdot 2^{-x}$

Vertical shrink  
 by 0.5  
 Reflect over  $y$   
 $(-x, 0.5y)$

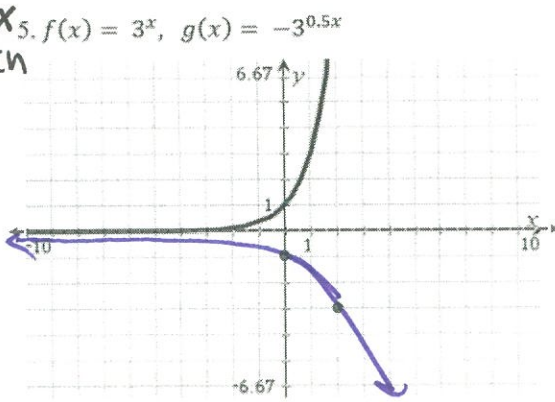


Domain:  $(-\infty, \infty)$  Range:  $(0, \infty)$

$y$ -intercept:  $(0, 0.5)$  Asymptote:  $y = 0$

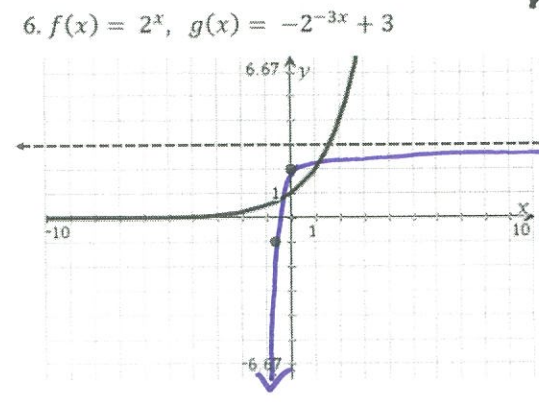
End Behavior: As  $x \rightarrow -\infty, f(x) \rightarrow \infty$   
 As  $x \rightarrow \infty, f(x) \rightarrow 0$

Reflect over x  
Horizontal stretch  
by 0.5  
 $(\frac{x}{0.5}, -y)$   
 $(2x, -y)$



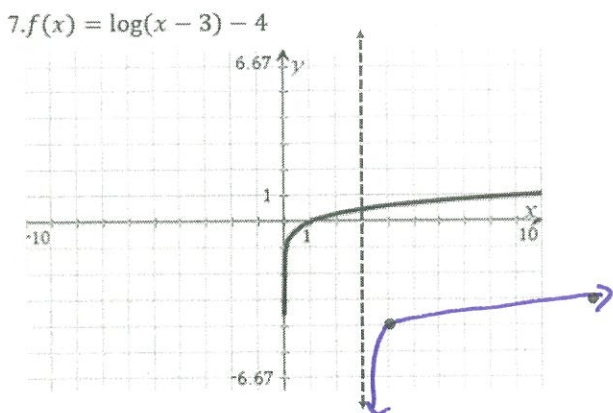
Domain:  $(-\infty, \infty)$       Range:  $(-\infty, 0)$   
y-intercept:  $(0, -1)$       Asymptote:  $y = 0$   
End Behavior: As  $x \rightarrow -\infty, f(x) \rightarrow 0$   
As  $x \rightarrow \infty, f(x) \rightarrow -\infty$

Reflect over x  
and y  
Horizontal shrink  
by 3  
up 3  
 $(-\frac{x}{3}, -y+3)$



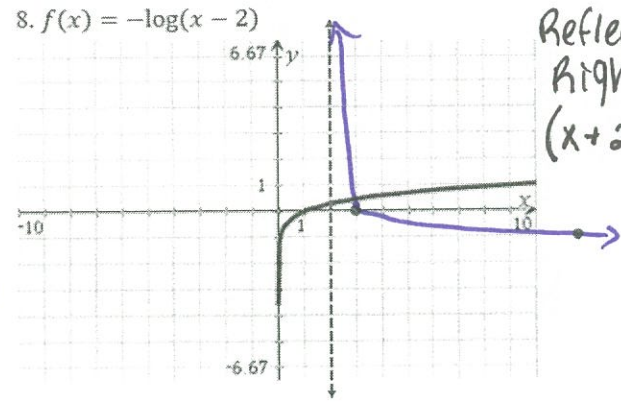
Domain:  $(-\infty, \infty)$       Range:  $(-\infty, 3)$   
y-intercept:  $(0, 2)$       Asymptote:  $y = 3$   
End Behavior: As  $x \rightarrow -\infty, f(x) \rightarrow -\infty$   
As  $x \rightarrow \infty, f(x) \rightarrow 3$

Right 3  
down 4  
 $(x+3, y-4)$



Domain:  $(3, \infty)$       Range:  $(-\infty, \infty)$   
y-intercept: None      Asymptote:  $x = 3$   
End Behavior: As  $x \rightarrow 3, f(x) \rightarrow -\infty$   
As  $x \rightarrow \infty, f(x) \rightarrow -\infty$

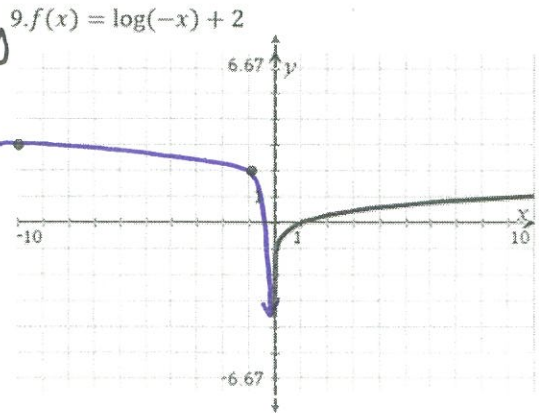
Reflect over x  
Right 2  
 $(x+2, -y)$



Domain:  $(-\infty, 2)$       Range:  $(-\infty, \infty)$   
y-intercept: None      Asymptote:  $x = 2$   
End Behavior: As  $x \rightarrow 2, f(x) \rightarrow \infty$   
As  $x \rightarrow \infty, f(x) \rightarrow -\infty$

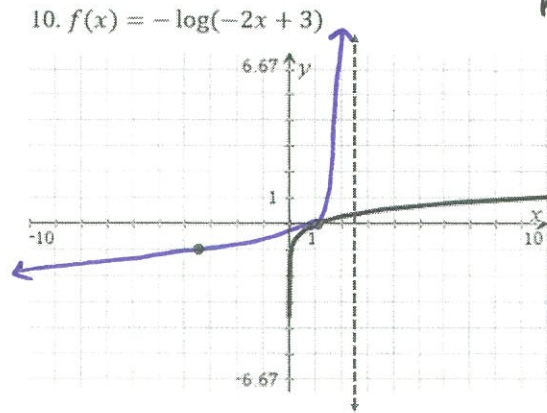
*\* (Horizontal, go left/right first then reflect)*

*Reflect over y  
up 2  
(-x, y+2)*



9.  $f(x) = \log(-x) + 2$   
 Domain:  $(-\infty, 0)$       Range:  $(-\infty, \infty)$   
 y-intercept: None      Asymptote:  $x = 0$   
 End Behavior: As  $x \rightarrow -\infty, f(x) \rightarrow \infty$   
 As  $x \rightarrow 0, f(x) \rightarrow -\infty$

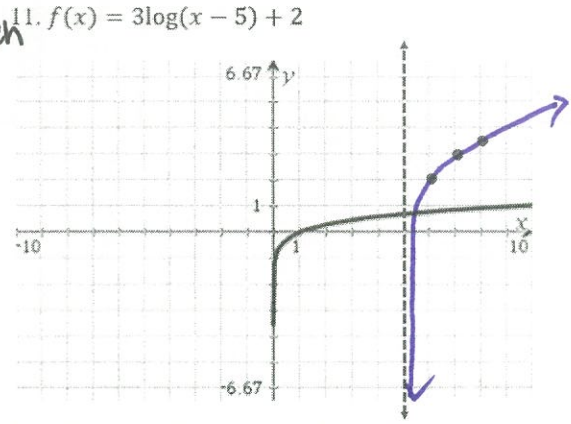
*Reflect over x  
and y  
Horizontal shrink  
by 2*



10.  $f(x) = -\log(-2x + 3)$   
 Domain:  $(-\infty, 1.5)$       Range:  $(-\infty, \infty)$   
 y-intercept:  $(0, -4.78)$       Asymptote:  $x = 1.5$   
 End Behavior: As  $x \rightarrow -\infty, f(x) \rightarrow -\infty$   
 As  $x \rightarrow 1.5, f(x) \rightarrow \infty$

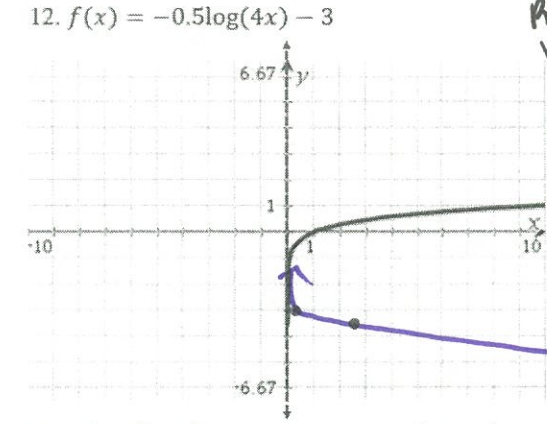
*Left 3  
(-x/2 - 3, -y)  
(-(x-3)/2, -y)*

*Vertical stretch  
by 3  
Right 5  
up 2  
(x+5, 3y+2)*



11.  $f(x) = 3\log(x - 5) + 2$   
 Domain:  $(5, \infty)$       Range:  $(-\infty, \infty)$   
 y-intercept: None      Asymptote:  $x = 5$   
 End Behavior: As  $x \rightarrow 5, f(x) \rightarrow -\infty$   
 As  $x \rightarrow \infty, f(x) \rightarrow \infty$

*Reflect over x  
Vertical shrink by  
0.5  
Horizontal shrink  
by 4*



12.  $f(x) = -0.5\log(4x) - 3$   
 Domain:  $(0, \infty)$       Range:  $(-\infty, \infty)$   
 y-intercept: None      Asymptote:  $x = 0$   
 End Behavior: As  $x \rightarrow 0, f(x) \rightarrow \infty$   
 As  $x \rightarrow \infty, f(x) \rightarrow -\infty$

*Down 3  
(x/4, -0.5y - 3)*