

$$y = a^{x-b} + c$$

$b \Rightarrow$  left/right  
 $c \Rightarrow$  up/down

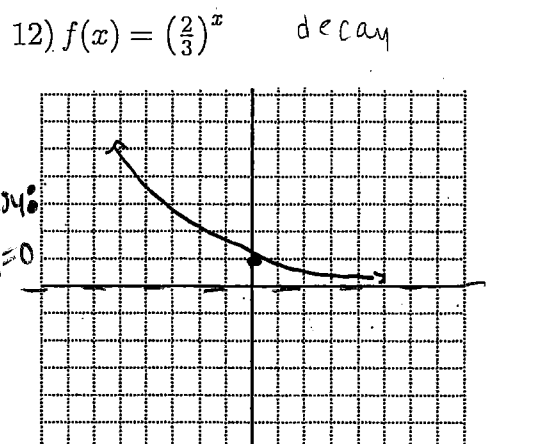
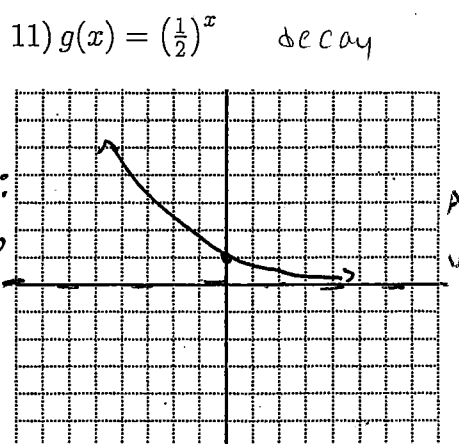
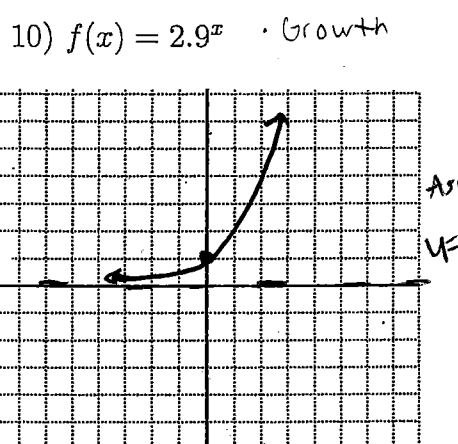
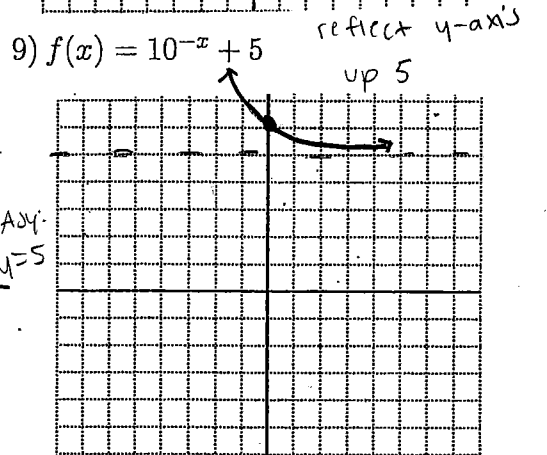
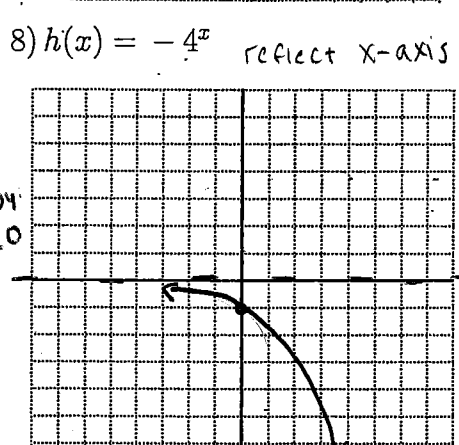
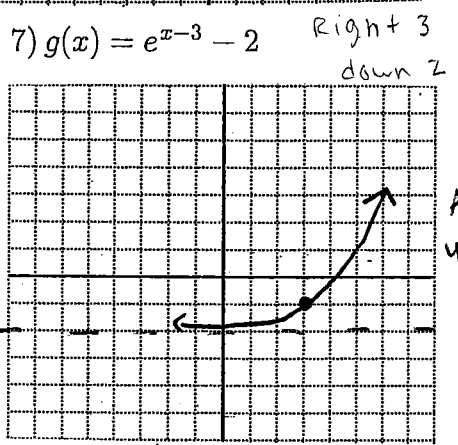
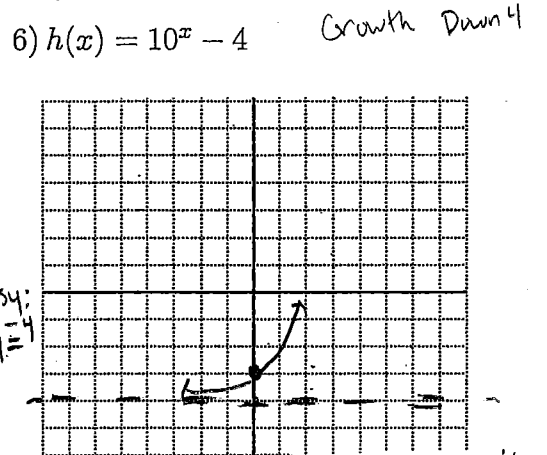
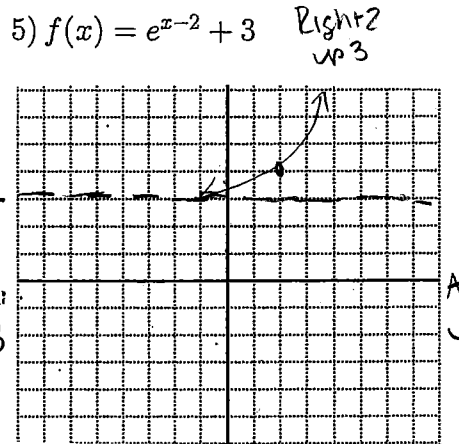
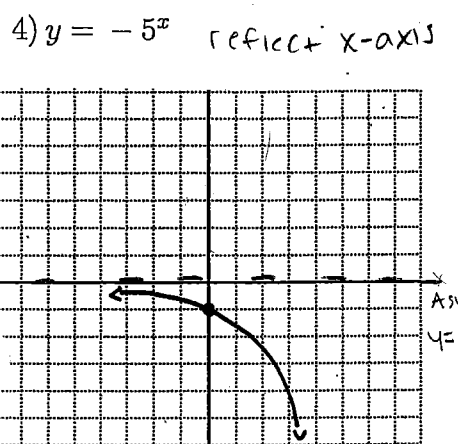
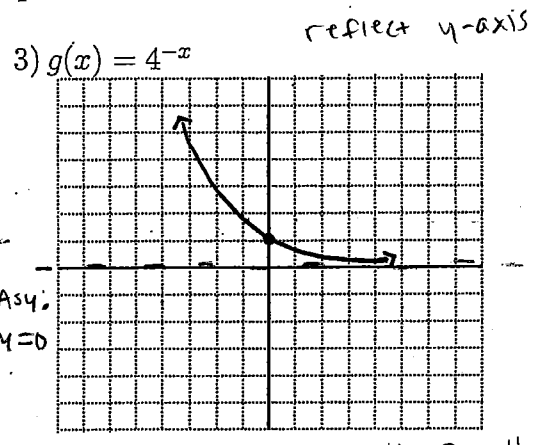
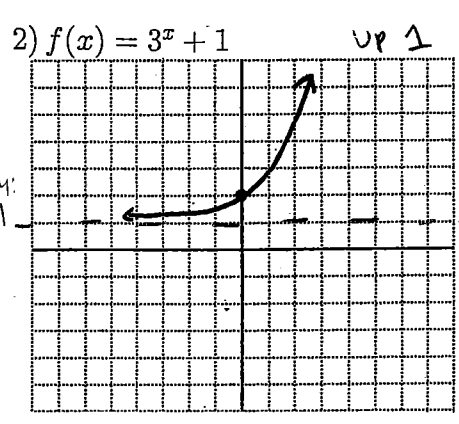
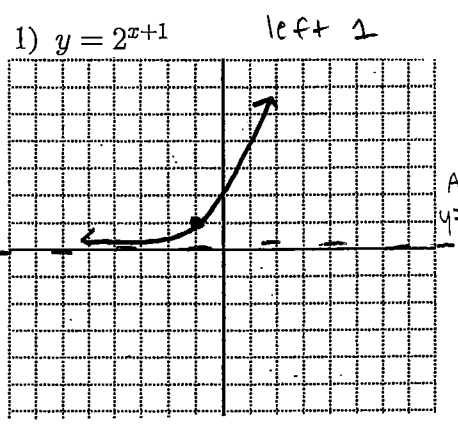
$-a \Rightarrow$  reflect in x-axis  
 $-x \Rightarrow$  reflect in y-axis

Analysis  
 Graphs of Exponentials

Do Not Use a Calculator!  
 \* inside = change  
 \* outside = keep

Name \_\_\_\_\_

Sketch a graph of the following functions. Label important points and asymptotes.



\* Inside = change  
\* Outside = keep

$$f(x) = \log_a(x-b) + c$$

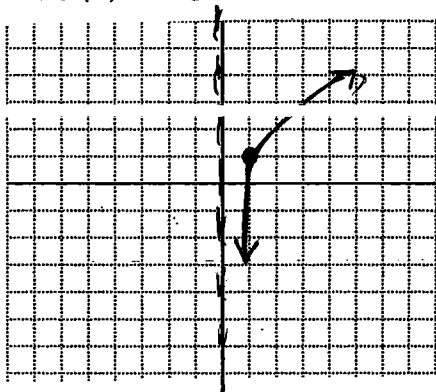
Parent function  
 $f(x) = \log(x)$



$-\log_a \dots$  reflection x-axis  
 $\log_a(-x)$  reflection y-axis  
 $b \Rightarrow$  left/right  
 $c \Rightarrow$  up/down

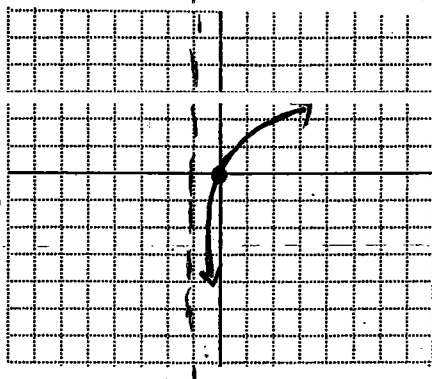
Sketch a graph of the following functions. Clearly mark important points and asymptotes!

13)  $f(x) = \log x + 1$  up 1



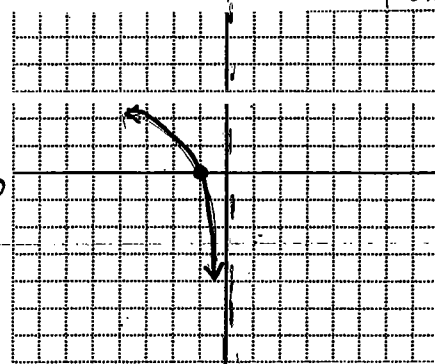
ASY:  
 $x=0$

14)  $f(x) = \log(x+1)$  left 1



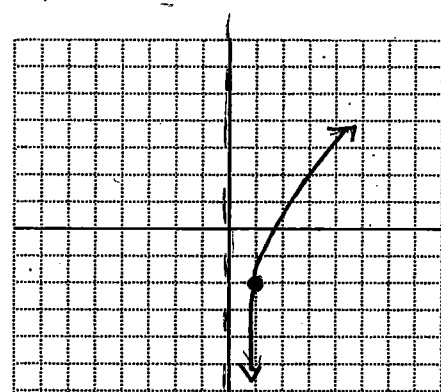
ASY:  
 $x=-1$

15)  $g(x) = \ln(-x)$  reflection over y-axis



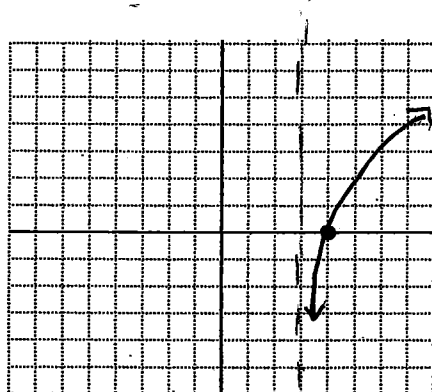
ASY:  
 $x=0$

16)  $y = \log_3 x - 2$  down 2



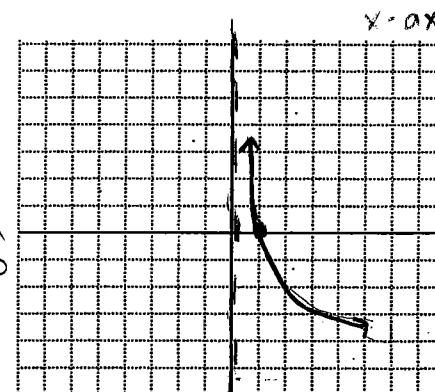
ASY:  
 $x=0$

17)  $y = \log_2(x-3)$  right 3



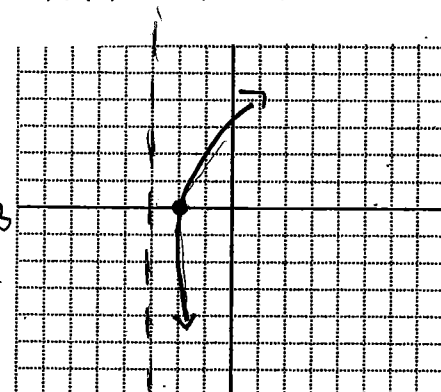
ASY:  
 $x=3$

18)  $y = -\log_4 x$  reflect over x-axis



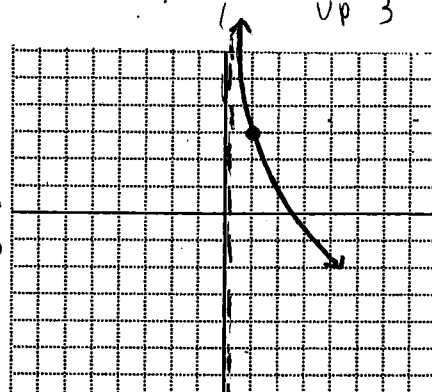
ASY:  
 $x=0$

19)  $g(x) = \ln(x+3)$  left 3



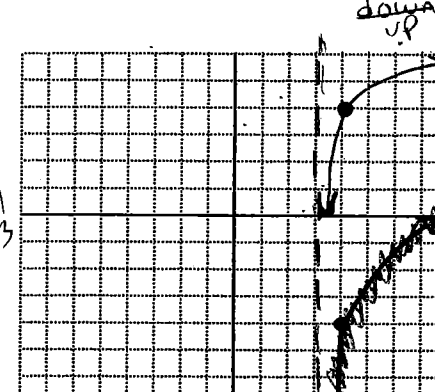
ASY:  
 $x=-3$

20)  $f(x) = -\log_5 x + 3$  reflect x, up 3



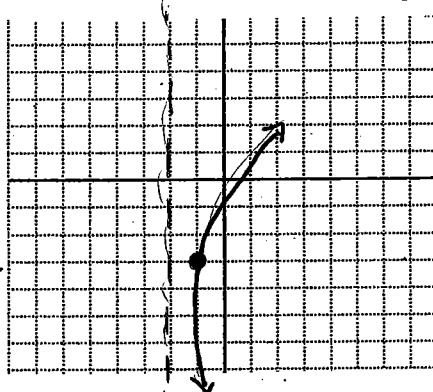
ASY:  
 $x=0$

21)  $h(x) = \ln(x-3) + 4$  right 3, down 4



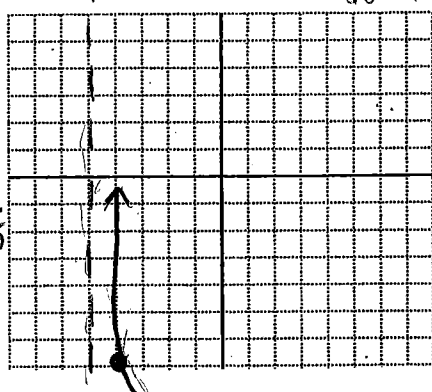
ASY:  
 $x=3$

22)  $f(x) = \log_3(x+2) - 3$  left 2, down 3



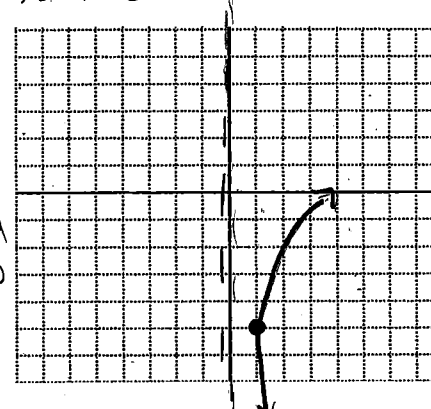
ASY:  
 $x=-2$

23)  $y = -\ln(x+5) - 7$  reflect x, left 5, down 7



ASY:  
 $x=-5$

24)  $y = \log_2 x - 5$  down 5



ASY:  
 $x=0$