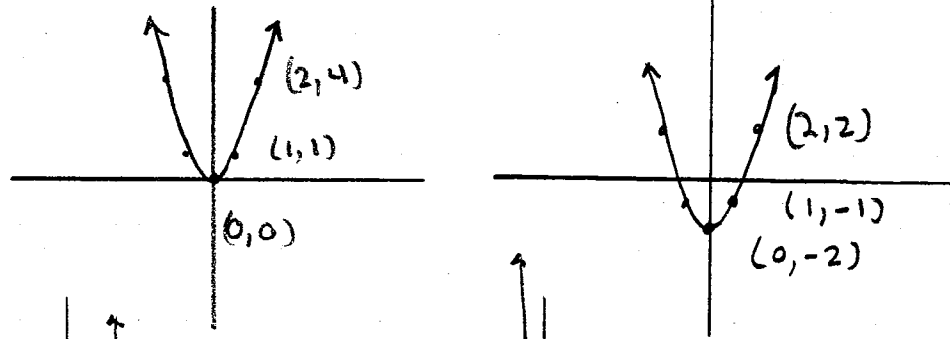
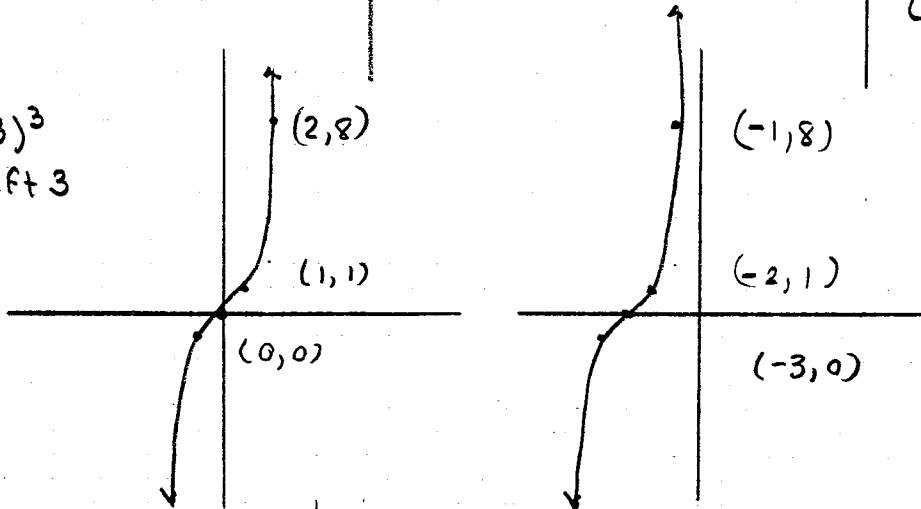


# Key - Single Transformations

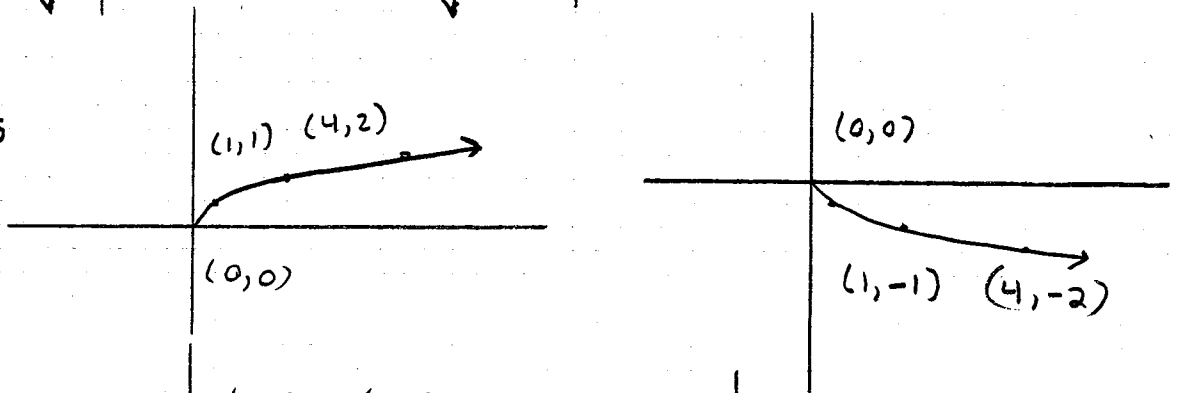
- 1)  $f(x) = x^2 - 2$   
shift down 2



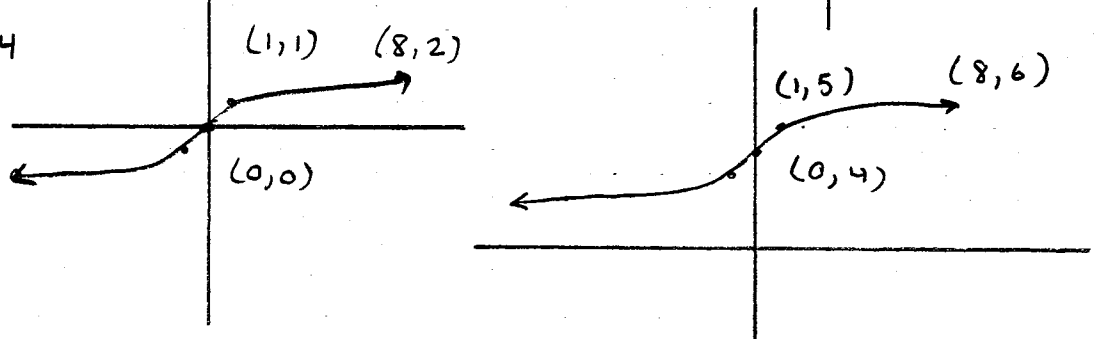
- 2)  $f(x) = (x+3)^3$   
shift left 3



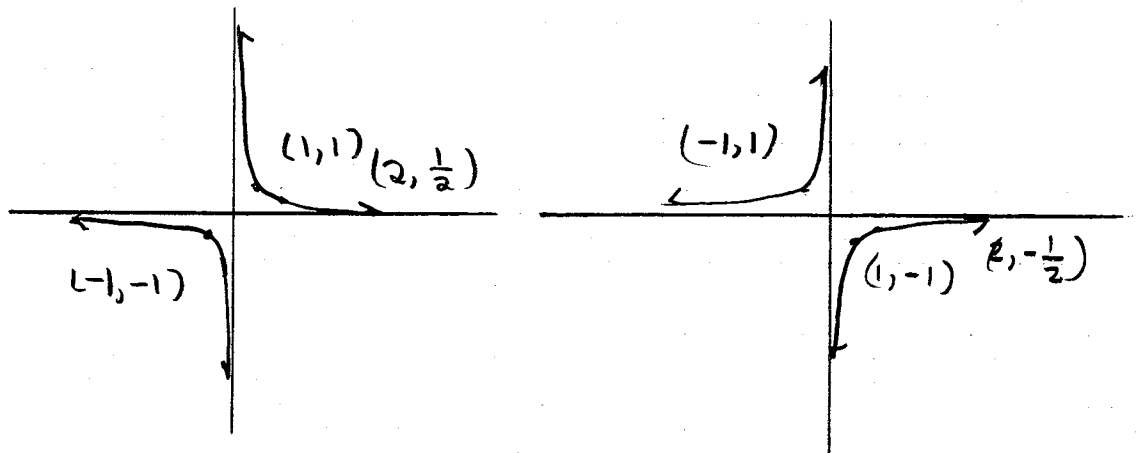
- 3)  $f(x) = -\sqrt{x}$   
reflect x axis



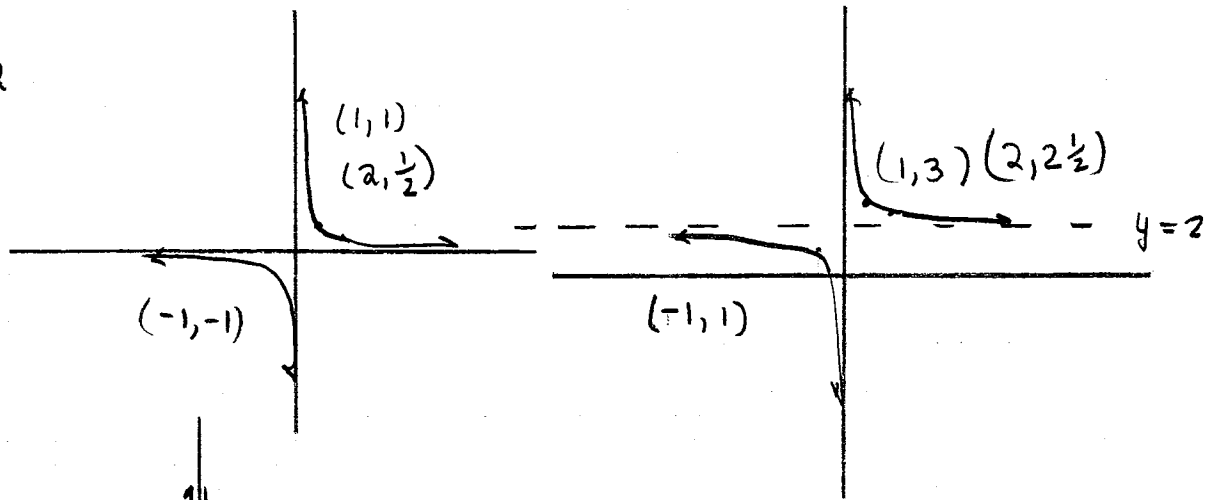
- 4)  $f(x) = \sqrt[3]{x} + 4$   
shift up 4



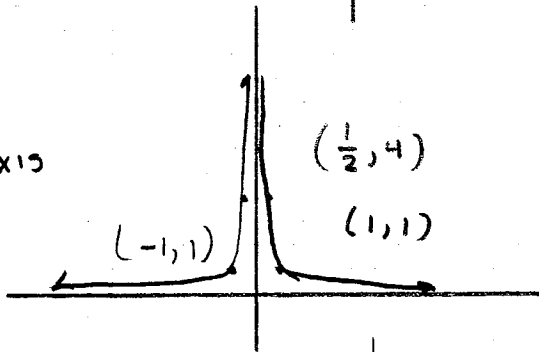
- 5)  $f(x) = -\frac{1}{x}$   
reflect x axis  
(or y axis)



6)  $f(x) = \frac{1}{x} + 2$   
 shift up 2

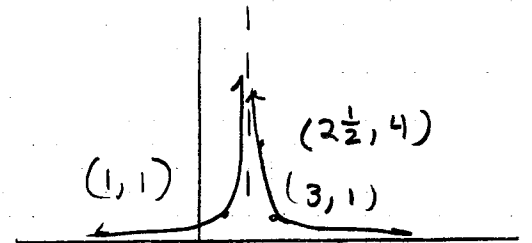
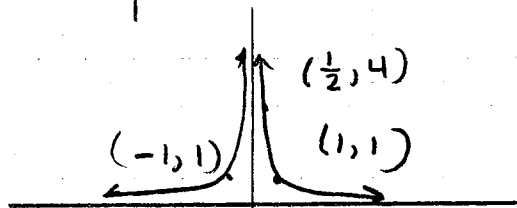


7)  $f(x) = \frac{1}{(-x)^2}$   
 reflect y axis

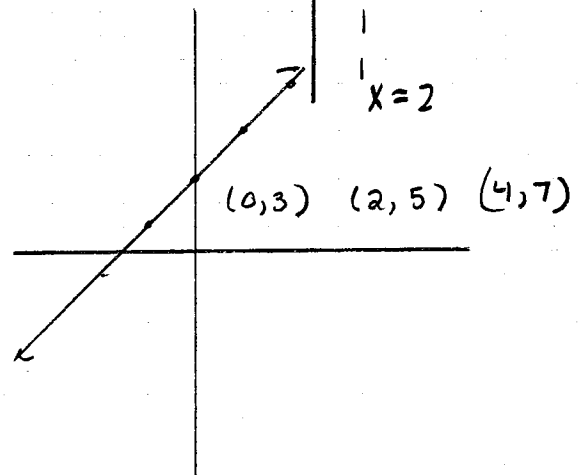
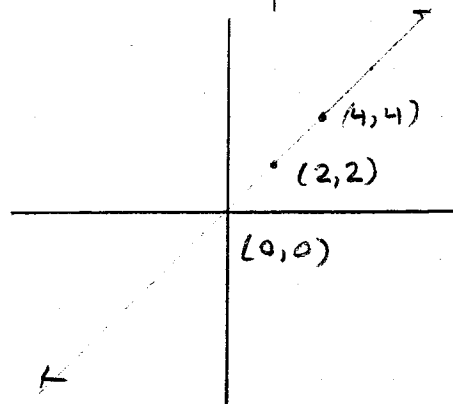


no change

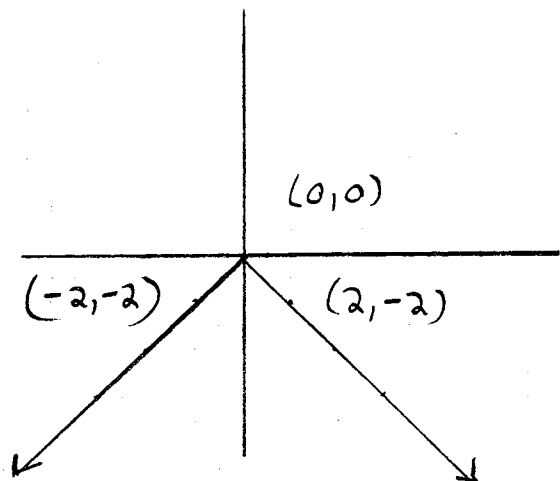
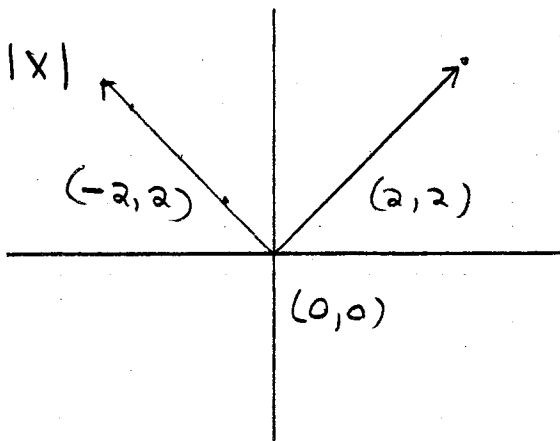
8)  $f(x) = \frac{1}{(x-2)^2}$   
 shift right 2



9)  $f(x) = x + 3$   
 shift up 3  
 (or left 3)

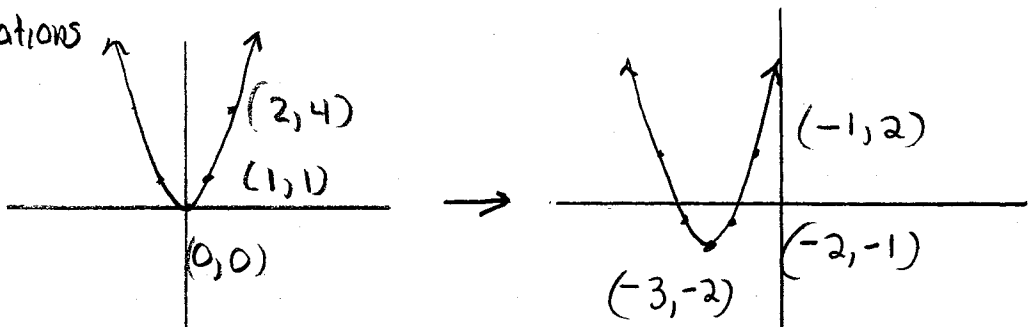


10)  $f(x) = -|x|$

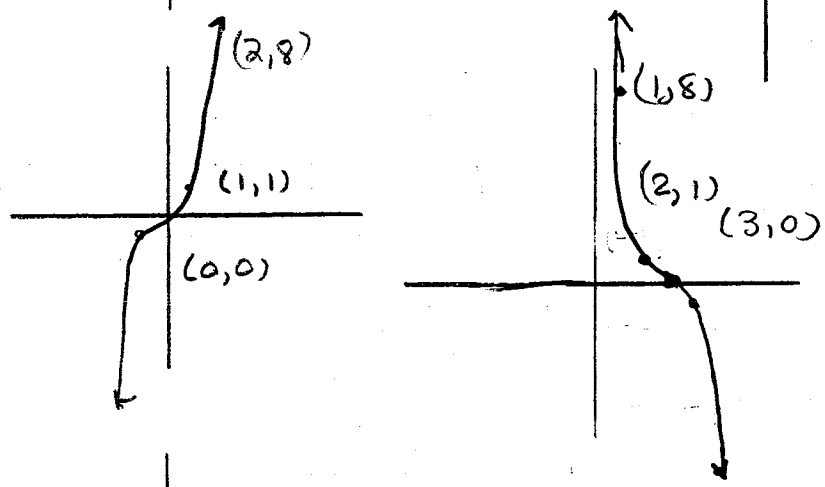


# Key - Multiple Transformations

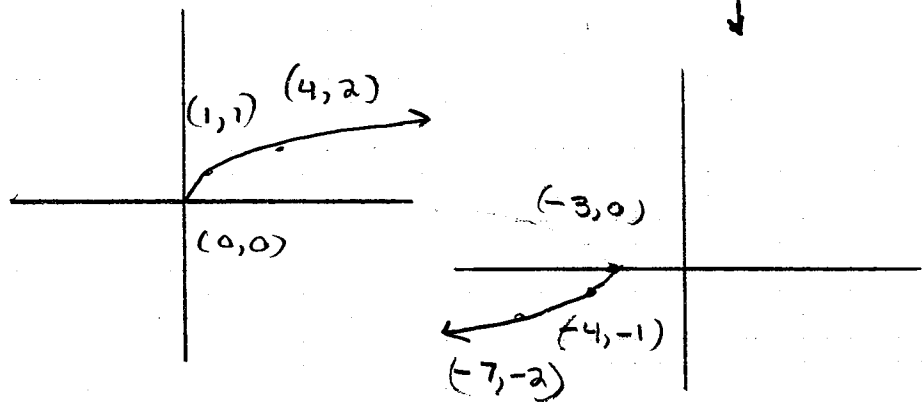
1)  $f(x) = (x+3)^2 - 2$   
 Shift left 3  
 Shift down 2



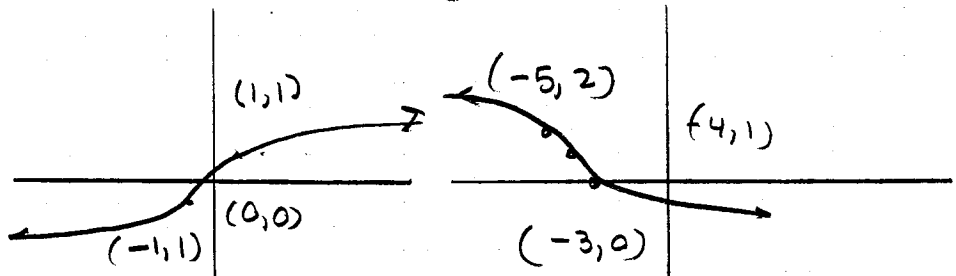
2)  $f(x) = (-x+3)^3$   
 Shift left 3  
 reflect y axis



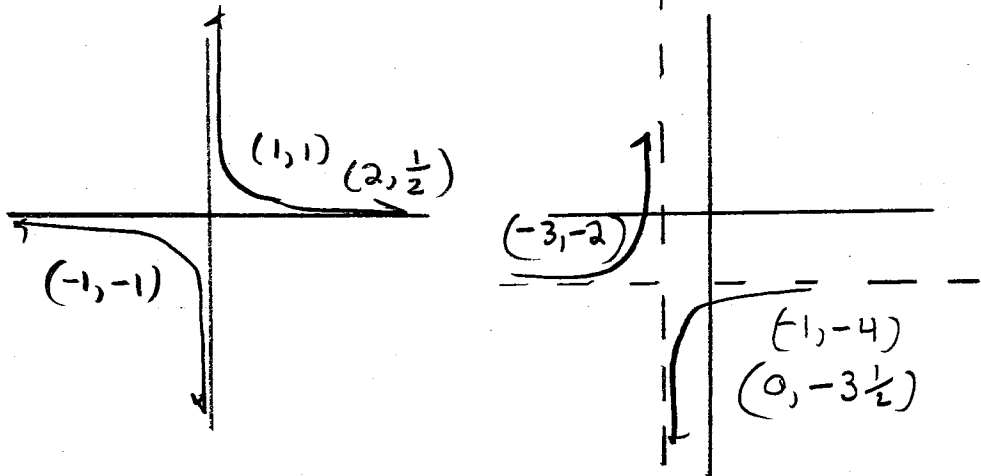
3)  $f(x) = -\sqrt{-x-3}$   
 Shift right 3  
 reflect y axis  
 reflect x axis



4)  $f(x) = -\sqrt[3]{x+4} + 1$   
 Shift left 4  
 reflect x axis  
 Shift up 1

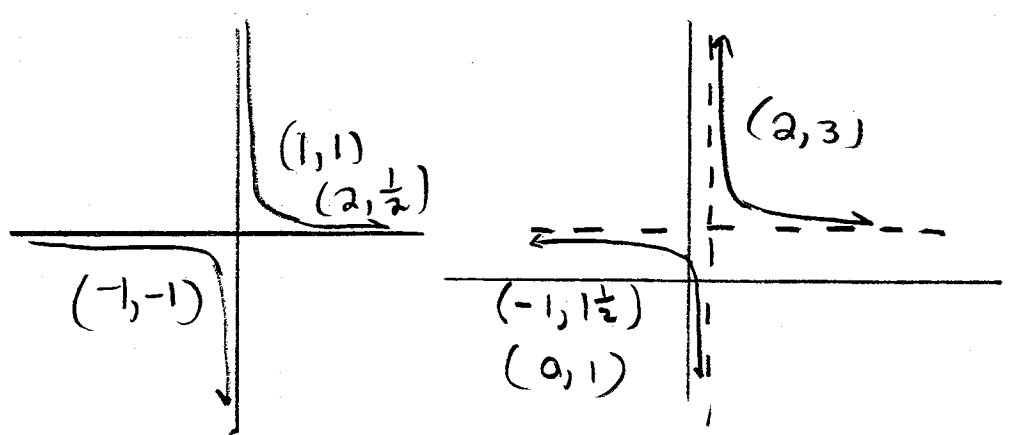


5)  $f(x) = -\frac{1}{x+2} - 3$   
 Shift left 2  
 reflect x axis  
 Shift down 3



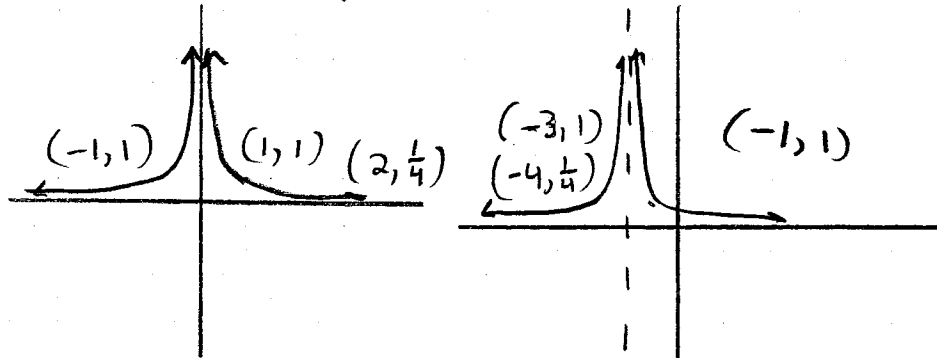
6)  $f(x) = -\frac{1}{-x+1} + 2$

shift left 1  
reflect y axis  
reflect x axis  
shift up 2



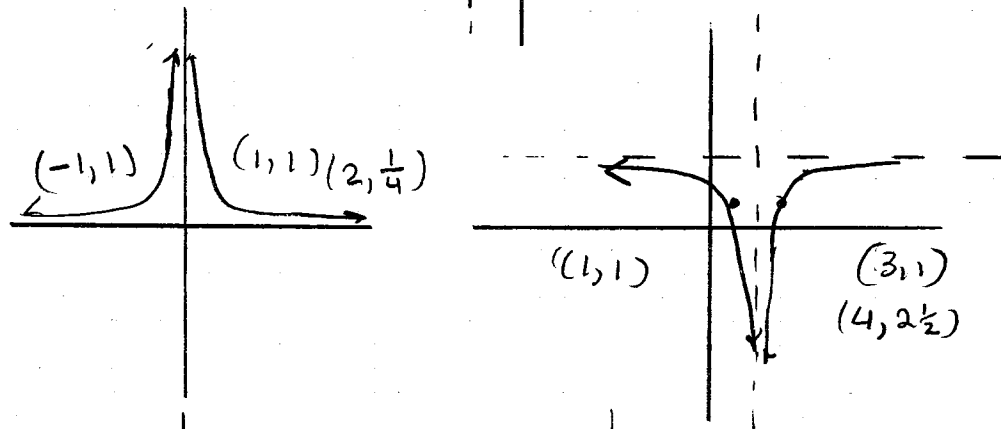
7)  $f(x) = \frac{1}{(-x-2)^2}$

shift right 2  
reflect y axis



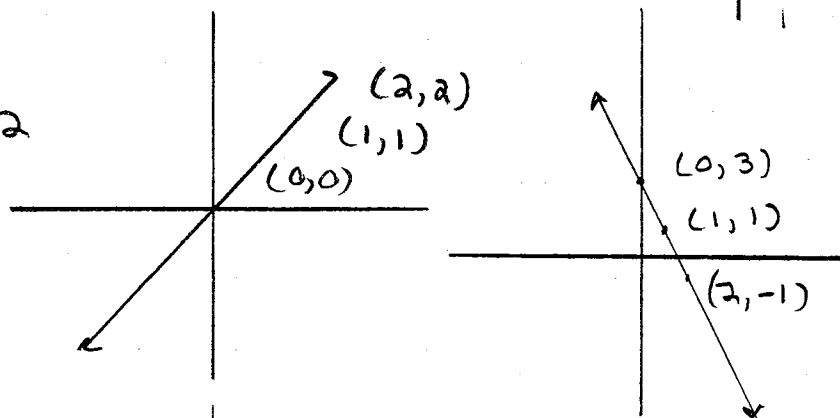
8)  $f(x) = -\frac{2}{(x-2)^2} + 3$

shift right 2  
reflect x axis  
stretch vertically by 2  
shift up 3



9)  $f(x) = -2x + 3$

stretch vertically by 2  
reflect x axis  
shift up 3



10)  $f(x) = -|-x+5| - 2$

shift left 5  
reflect y axis  
reflect x axis  
shift down 2

