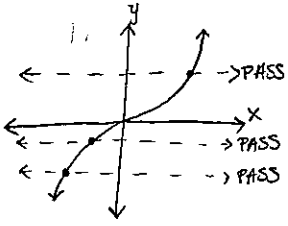
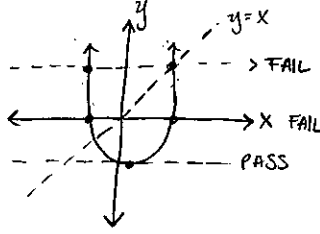


SECTION 0.4 INVERSE FUNCTION

REVIEW: HORIZONTAL LINE TEST  
test if function is 1 to 1.

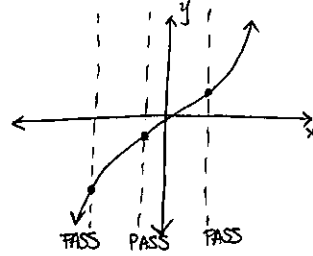


PASS  
IS a 1 to 1 function

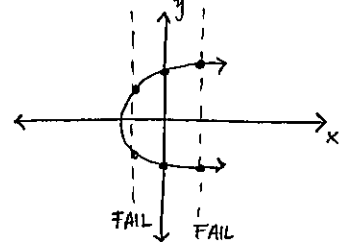


FAIL  
NOT a 1:1 function

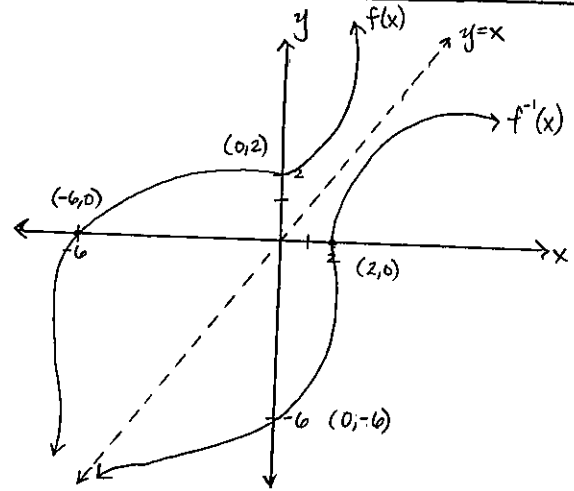
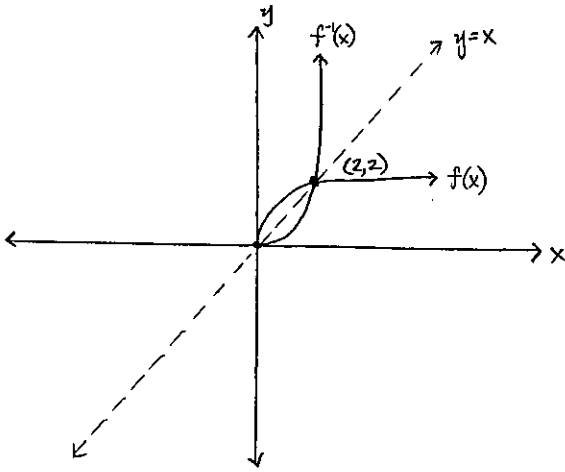
VERTICAL LINE TEST  
test if function is 1 to 1.



PASS  
IS a 1 to 1 function



FAIL  
NOT a 1 to 1 function.



**E1** Find  $f^{-1}(x)$

$$f(x) = 2x^2 + 1$$

$$y = 2x^2 + 1$$

$$x = 2y^2 + 1$$

$$-1 \quad \underline{-1}$$

$$\frac{x-1}{2} = \frac{2y^2}{2}$$

$$y = \sqrt{\frac{x-1}{2}}$$

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

$$f(x) \begin{cases} D: [0, +\infty) \\ R: [1, +\infty) \end{cases}$$

- I. Replace  $f(x)$  with  $y$ .
- II. Switch  $x$  with  $y$  &  $y$  with  $x$ .
- III. Solve for  $y$ .
- IV. Replace  $y$  with  $f^{-1}(x)$ .

$$f^{-1}(x) \begin{cases} D: [1, +\infty) \\ R: [0, +\infty) \end{cases}$$

**E2** Find  $f^{-1}(x)$

$$f(x) = e^{x-2} + 3$$

$$y = e^{x-2} + 3$$

$$x = e^{y-2} + 3$$

$$x - 3 = e^{y-2}$$

$$\ln(x-3) = (y-2) \ln e$$

$$y = \ln(x-3) + 2$$

$$f^{-1}(x) = \ln(x-3) + 2$$

$$f(x) \begin{cases} D: \mathbb{R} \\ R: (3, +\infty) \end{cases}$$

$$f^{-1}(x) \begin{cases} D: (3, +\infty) \\ R: \mathbb{R} \end{cases}$$

**NOTE:**

Compare the D&R of  $f(x)$  to the D&R of  $f^{-1}(x)$ . See any patterns?  
The D of  $f(x)$  is the R of  $f^{-1}(x)$  and the R of  $f(x)$  is the D of  $f^{-1}(x)$ .