

2)  $x = \frac{-2t+2}{-2}$

$\frac{x-2}{-2} = \frac{-2t}{-2}$

$-\frac{1}{2}x+1 = t$

$y = \frac{4t^2}{5} - 2$

$y = \frac{4(-\frac{1}{2}x+1)^2}{5} - 2$

$y = \frac{x^2 - 4x + 4}{5} - 2$

$y = \frac{x^2 - 4x - 6}{5}$

$(-\frac{1}{2}x+1)(-\frac{1}{2}x+1)$   
 $\frac{1}{4}x^2 - 1x + 1$   
 $-\frac{1}{2} \cdot -\frac{1}{2} = \frac{1}{4}$

5)  $x = \frac{-t^2}{3}$      $y = t$

$x = \frac{-(y)^2}{3}$

$\sqrt{-3x} = \sqrt{y^2}$

$\pm i\sqrt{3}x = y$

7)  $x = -2t - 3$      $y = 2t^2 + 2t - \frac{5}{2}$

$\frac{x+3}{-2} = -2t$

$-\frac{1}{2}x - \frac{3}{2} = t$

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

$\frac{1}{4}x^2 + \frac{6}{4}t + \frac{9}{4}$

$\frac{1}{2}x^2 + 3x + \frac{9}{2} - 1x - 3 - \frac{5}{2}$

$(-\frac{1}{2}x - \frac{3}{2})(-\frac{1}{2}x - \frac{3}{2}) - \frac{1}{2} \cdot \frac{3}{2}$

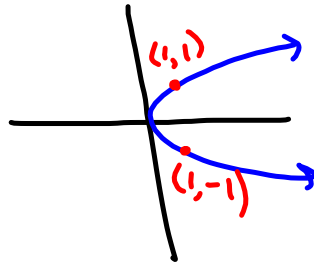
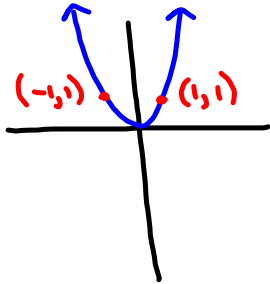
$\frac{1}{4}x^2 + \frac{3}{4} + \frac{3}{4} + \frac{9}{4}$

$\frac{6}{4}$

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

# 1.5 Inverse Relations and Functions

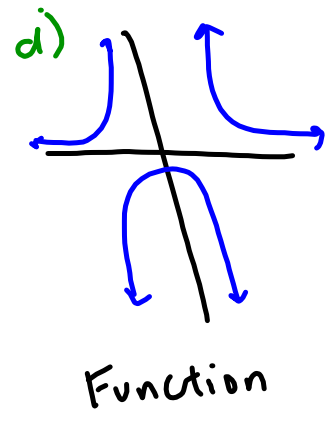
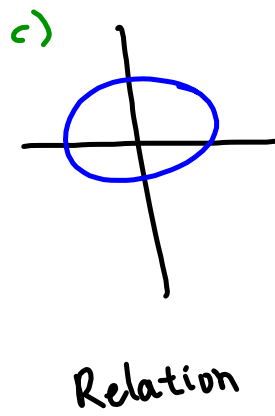
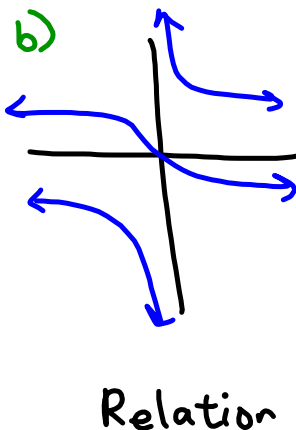
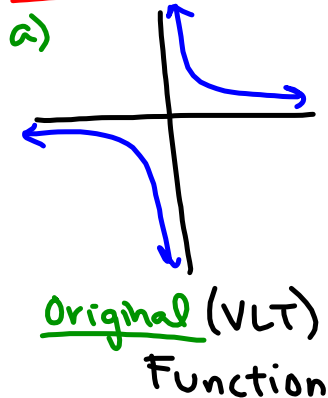
ordered pair  $(a, b)$  is in a relation  
 if and only if  $(b, a)$  is in the inverse relation



## Horizontal Line Test

The inverse of a relation is a function if & only if each horizontal line intersects the graph at most one time on the original

Ex



Inverse (HLT)  
Function

Function

Relation

Relation

(Graph a)

A function whose inverse is a function [passes both VLT/HLT] is called one-to-one

each  $x$  has a unique  $y$

each  $y$  has a unique  $x$

If  $f$  is one-to-one with domain  $D$  and range  $R$   
 then the inverse function of  $f$  is denoted  
 $f^{-1}$  with domain  $R$  and range  $D$

$$f^{-1}(b) = a \text{ iff } f(a) = b$$

Ex Find the inverse algebraically

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

$$y = \frac{x}{x+1}$$

Switch  
 $x \leftrightarrow y$

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

$$xy + x = y$$

$$xy - y = -x$$

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

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

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

Ex a)  $y = -\frac{3}{4}x + 5$

$$x = -\frac{3}{4}y + 5$$

$$\left(\frac{-4}{3}\right)(x-5) = \left(\frac{-4}{3}\right)\left(-\frac{3}{4}y\right)$$

$$-\frac{4}{3}x + \frac{20}{3} = y$$

$$f^{-1}(x) = -\frac{4}{3}x + \frac{20}{3}$$

b)  $y = (x+3)^2$

$$x = (y+3)^2$$

$$\pm\sqrt{x} = y+3$$

$$-3 \pm \sqrt{x} = y$$

$$f^{-1}(x) = -3 \pm \sqrt{x}$$

c)  $y = \sqrt{x} + 8$

$$x = \sqrt{y} + 8$$

$$x-8 = \sqrt{y}$$

$$(x-8)^2 = y$$

$$f^{-1}(x) = (x-8)^2$$

p135 # 9-12, 14-22  
 evens