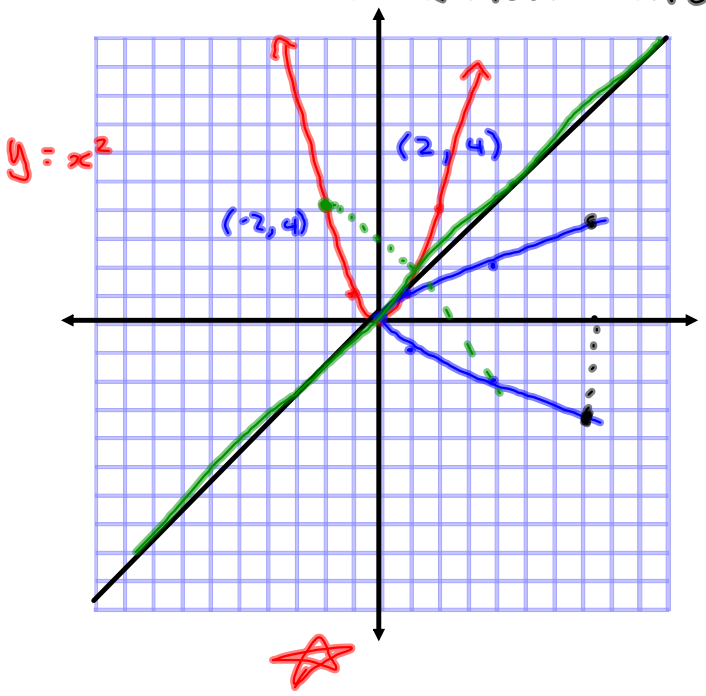
Unit 5 : Inverse of a Real Function

↳ a reflection of the function around the line $y = x$



$f(x)$ - function

$f^{-1}(x)$ - inverse of a function

Inverse: replace x with y and y with x

For f^{-1}

Same thing for source and target set

$\text{Dom } f^{-1} = \text{Range } f$

$\text{Range } f^{-1} = \text{Domain } f$

Ex 1
p 5.2

$f = \{(1,2), (2,3), (3,4), (4,5)\}$

Dom $f = \{1, 2, 3, 4\}$

Range $f = \{2, 3, 4, 5\}$

$f^{-1} = \{(2,1), (3,2), (4,3), (5,4)\}$

Dom $f^{-1} = \{2, 3, 4, 5\}$ = Range F

Range $f^{-1} = \{1, 2, 3, 4\}$ = Dom f

Ex 2
p 5.5

Find the inverse of

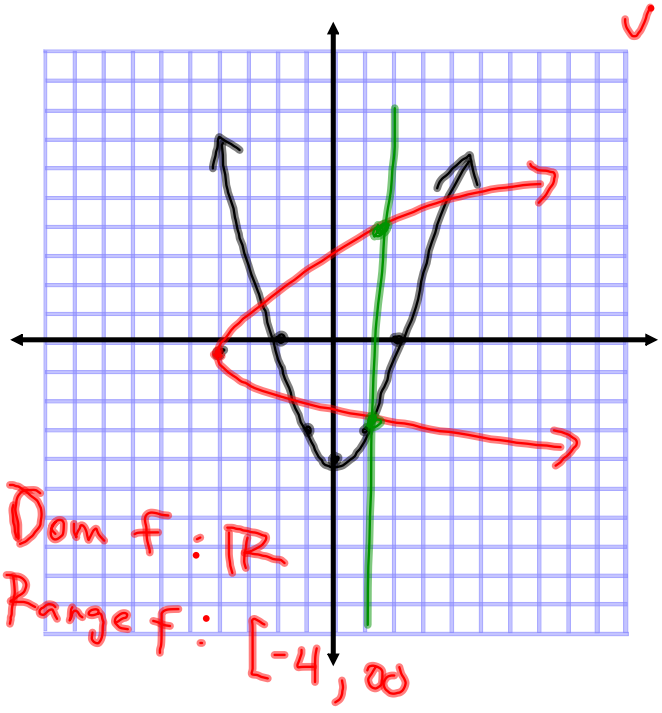
$f(x) = x^2 - 4$

$y = x^2 - 4$

$y = a(b(x-h))^2 + k$

$V(h,k)$

$V(0,-4)$



Dom f : $\mathbb{R}$

Range f : $[-4, \infty)$

To find the inverse of a function algebraically

1. switch x and y in the equation
2. Solve for y (isolate y)

ex : $y = x^2 - 4$

$x = y^2 - 4$

$x + 4 = y^2$

$y = \pm\sqrt{x+4}$

Dom f^{-1} $[-4, \infty)$

Range f^{-1} : $\mathbb{R}$

Find the inverse of

$$f(x) = \{(x,y) \in [0,10] \times \mathbb{R} \mid f(x) = 4x - 5\}$$

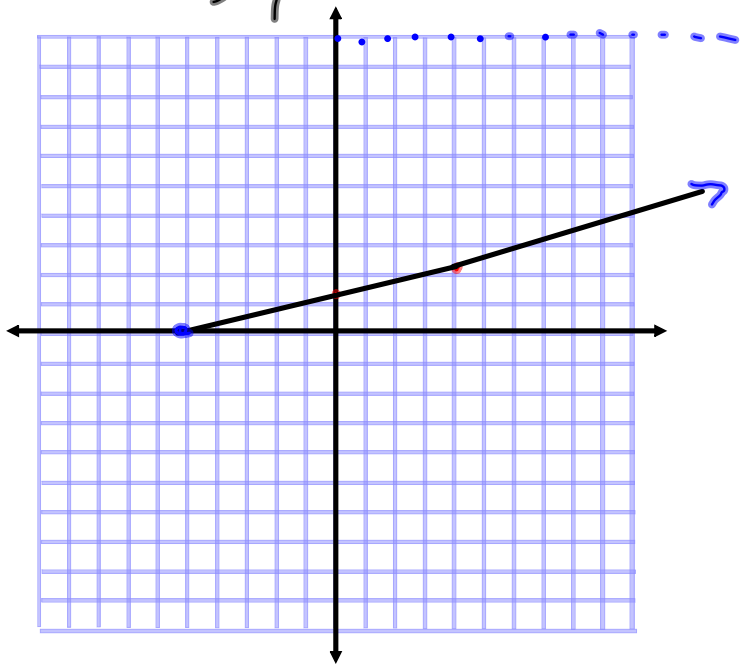
$$y = 4x - 5$$

$$x = 4y - 5$$

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

$$y = \frac{1}{4}x + \frac{5}{4}$$

$$f^{-1} = \{(x,y) \in \mathbb{R} \times [0,10] \mid f^{-1}(x) = \frac{1}{4}x + \frac{5}{4}\}$$



Ex 5

p 5.29

find the inverse of

$f(x) = 2\sqrt{x-2} + 4$

$f(x) = a\sqrt{b(x-h)} + k$

$y = 2\sqrt{x-2} + 4$

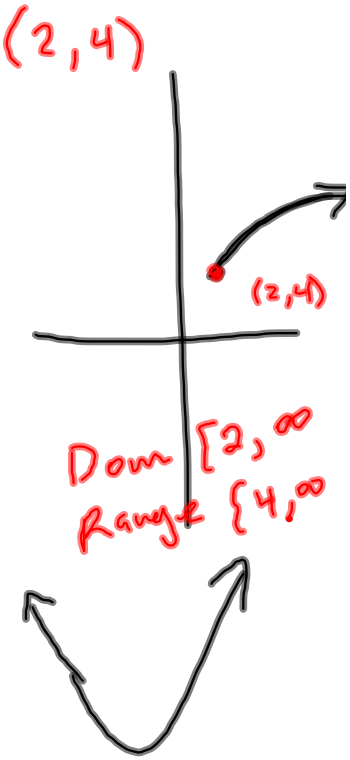
$x = 2\sqrt{y-2} + 4$

$\frac{x-4}{2} = \frac{2\sqrt{y-2}}{2}$

$\left(\sqrt{y-2}\right)^2 = \left(\frac{x-4}{2}\right)^2$

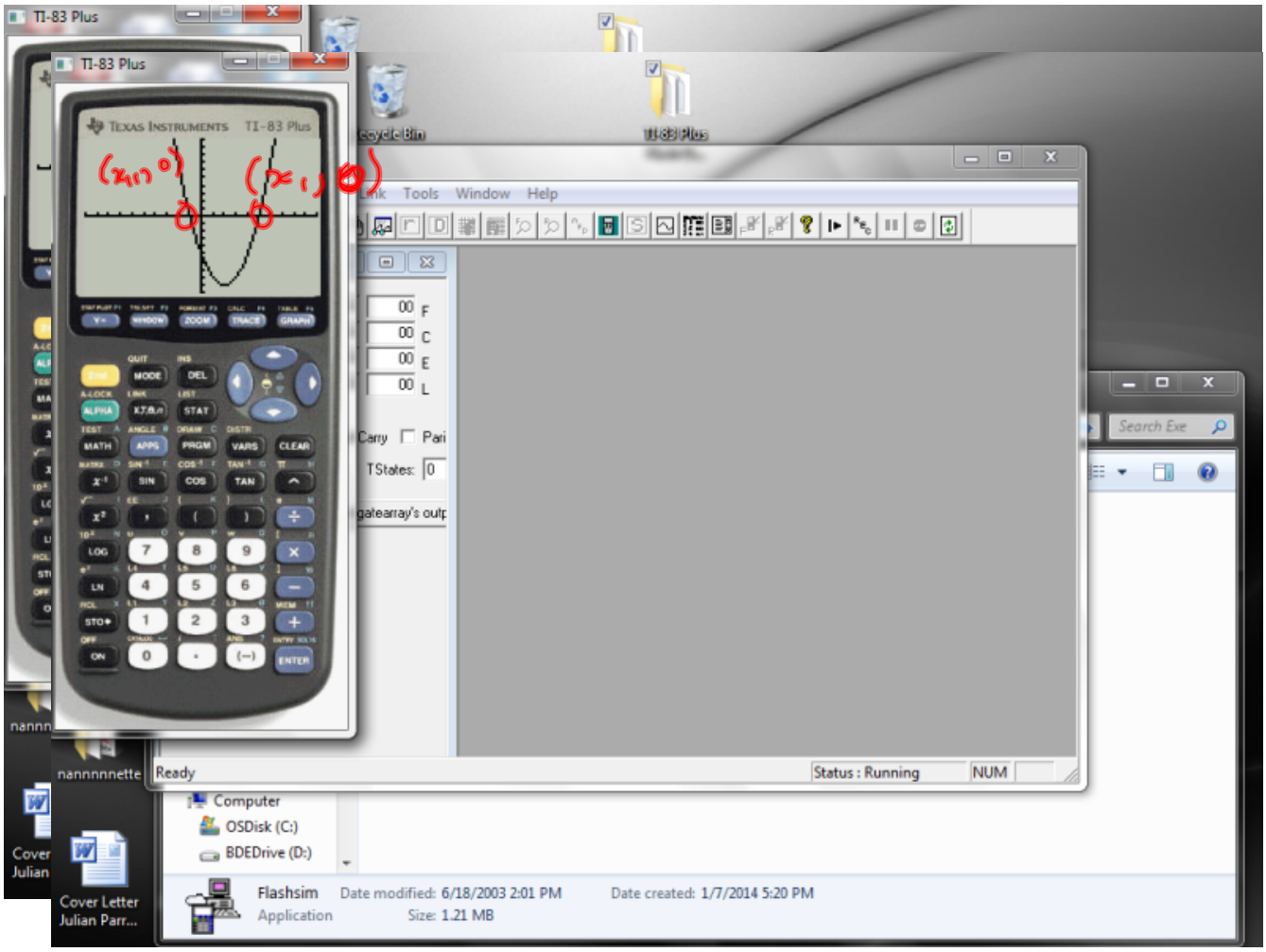
$y = \left(\frac{x-4}{2}\right)^2 + 2$

$f^{-1}(x) = \left(\frac{x-4}{2}\right)^2 + 2$



Dom f^{-1} $[4, \infty$

Range f^{-1} $[2, \infty$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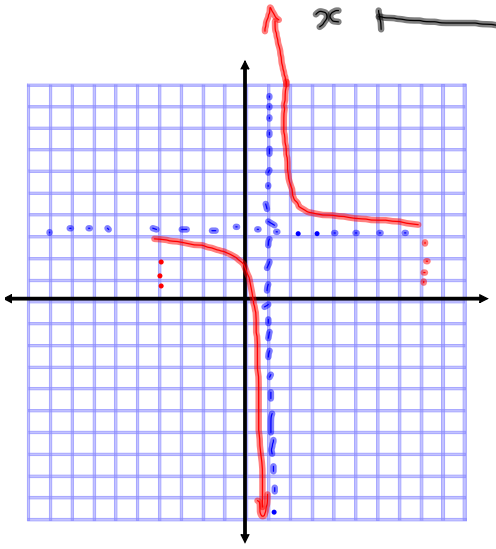
Cover Letter Julian Parr...

Find the inverse:

$f : [-4, 8] \longrightarrow \mathbb{R}$



$x \longmapsto \frac{3}{x-1} + 3$

$y = \frac{a}{b(x-h)} + k$

$x = h$, $y = k$ } asymptotes

$y = \frac{3}{x-1} + 3$

$x = \frac{3}{y-1} + 3$

$x - 3 = \frac{3}{y-1}$

$\frac{(y-1)(x-3)}{(x-3)} = \frac{3}{x-3}$

$(y-1) = \frac{3}{x-3}$

$y = \frac{3}{x-3} + 1$

$x = 3$
$y = 1$

$f^{-1} \quad \mathbb{R} \longrightarrow [-4, 8]$

$x \longrightarrow \frac{3}{x-3} + 1$