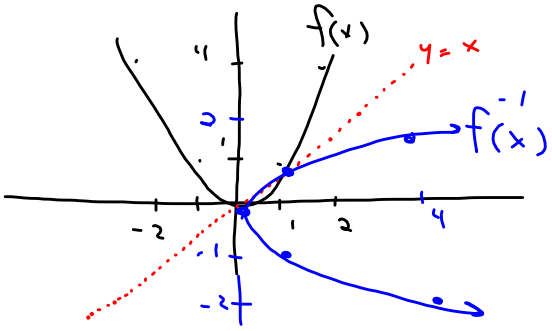
3.3 Inverse of Quadratics

Mar 12

Examine the inverse of the function $f(x) = x^2$



$y = x^2 \quad \overset{x \leftrightarrow y}{\longleftrightarrow} \quad x = y^2$

$y = \pm\sqrt{x}$

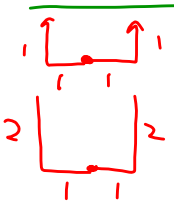
$\therefore f^{-1}(x) = \pm\sqrt{x}$

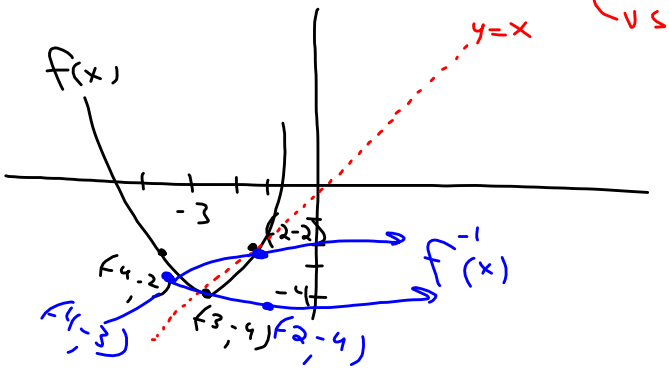
$\therefore f(x) = x^2,\ x \geq 0 \longrightarrow f^{-1}(x) = \sqrt{x}$

$f(x) = x^2,\ x \leq 0 \longrightarrow f^{-1}(x) = -\sqrt{x}$

Graph the following function and its inverse and determine the equation of the inverse. $f(x) = 2(x+3)^2 - 4$

STEP PATTERN





$f(x) = 2(x+3)^2 - 4$

$y = 2(x+3)^2 - 4$

$x \leftrightarrow y \quad x = 2(y+3)^2 - 4$

$x + 4 = 2(y+3)^2$

$\frac{x+4}{2} = (y+3)^2$

$\pm\sqrt{\frac{x+4}{2}} = y + 3$

$f^{-1}(x) = y = \pm\sqrt{\frac{x+4}{2}} - 3$

$\therefore f(x) = 2(x+3)^2 - 4,\ x \geq -3 \longrightarrow f^{-1}(x) = \sqrt{\frac{x+4}{2}} - 3$

$f(x) = 2(x+3)^2 - 4,\ x \leq -3 \longrightarrow f^{-1}(x) = -\sqrt{\frac{x+4}{2}} - 3$

Determine the inverse of $f(x) = \sqrt{\frac{x-4}{-2}} - 1$

$y = \sqrt{\frac{x-4}{-2}} - 1$ RGF y HS 2

$x \leftrightarrow y$

$x = \sqrt{\frac{y-4}{-2}} - 1$

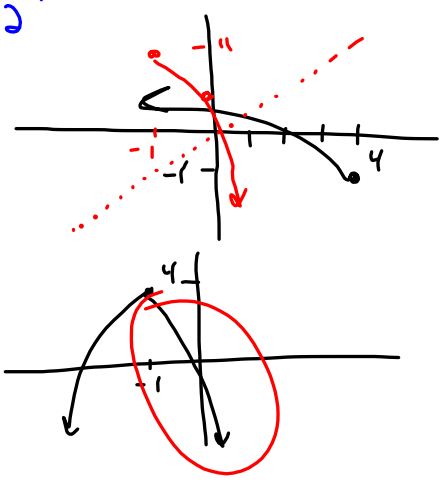
$x + 1 = \sqrt{\frac{y-4}{-2}}$

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

$-2(x+1)^2 = y - 4$

$-2(x+1)^2 + 4 = y = f^{-1}(x)$

$\therefore f^{-1}(x) = -2(x+1)^2 + 4, \quad x \geq -1$



Homework p.160 #1-10,12,13