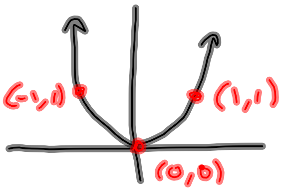
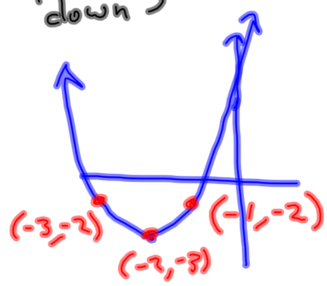
Q5

① $g(x) = (x+2)^2 - 3$

left 2 down 3

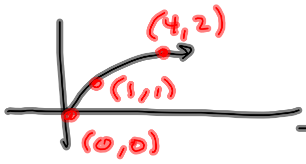


$f(x) = x^2$

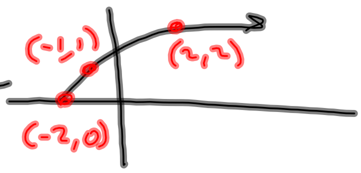


② $-\sqrt{2-x} + 5 = -\sqrt{-x+2} + 5 = g(x)$

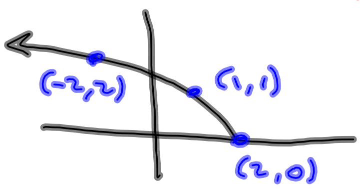
$f(x) = \sqrt{x}$



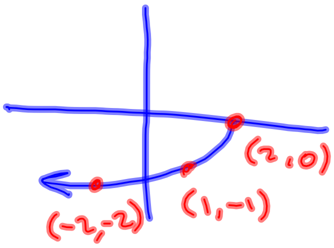
$f(x+2) = \sqrt{x+2}$



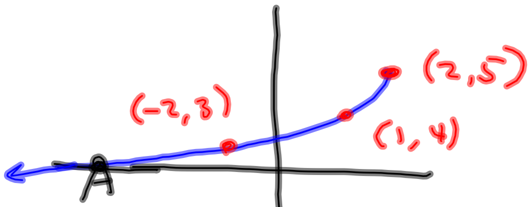
$\sqrt{-x+2} = f(-x+2)$



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



$g(x) = -f(-x+2) + 5$
$= -\sqrt{-x+2} + 5$



Bonus! x-int:

$-\sqrt{-x+2} + 5 = 0$

$-\sqrt{-x+2} = -5$

$\sqrt{-x+2} = 5$

$-x + 2 = 25$

$-x = 23$

$x = -23$

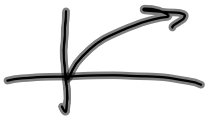
$\boxed{(-23, 0) = A}$

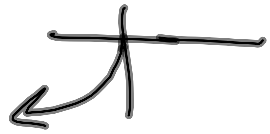
Sep 26-10:06 AM

I prefer reflections 1^{st} so I'd do it this (MAT 122)

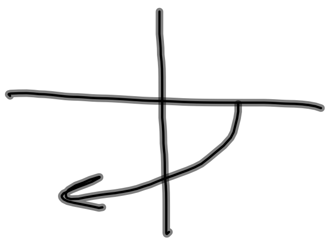
$$g(x) = -\sqrt{2-x} + 5 = -\sqrt{-(x-2)} + 5$$

$\sqrt{x}$ $\sqrt{-x}$ $-\sqrt{-x}$

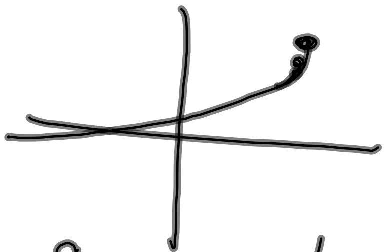




$-\sqrt{-(x-2)}$

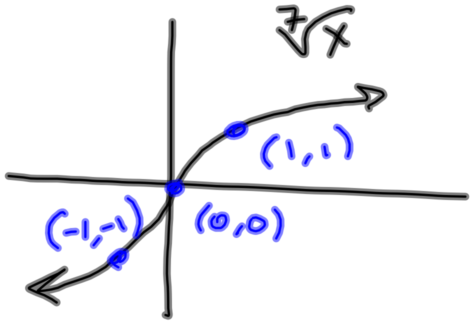


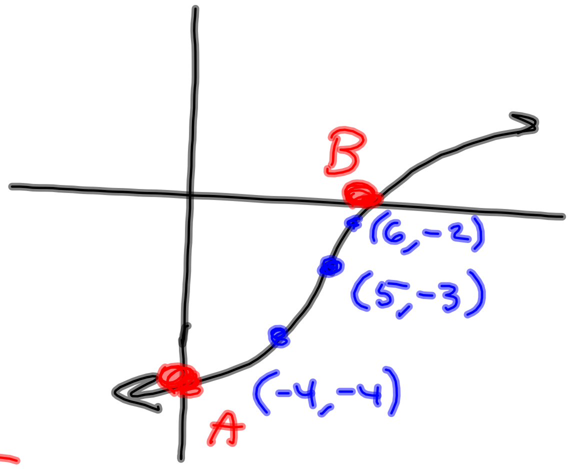
$-\sqrt{-(x-2)} + 5$



Compare to previous.

$\sqrt[7]{x-5} - 3$ Right 5, down 3





$$\boxed{A: \left(0, \sqrt[7]{-5} - 3\right)}$$

B: $\sqrt[7]{x-5} - 3 \underline{\text{SET}}\ 0$

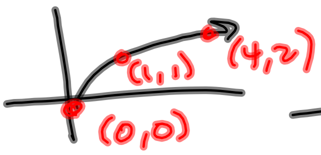
$$\sqrt[7]{x-5} = 3$$

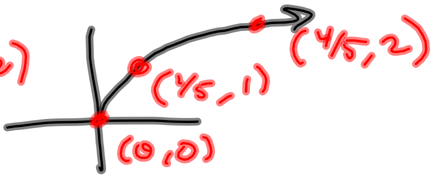
$$x-5 = 3^7$$

$$x = 3^7 + 5 \rightsquigarrow \boxed{(3^7+5,\ 0) = B}$$

$g(x) = 2\sqrt{5x-10} = 2\sqrt{5(x-2)}$

$\sqrt{x} \longrightarrow \sqrt{5x}$





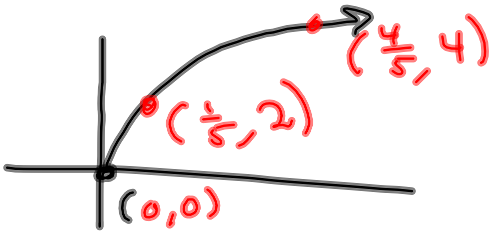
$f(5x)$:

$(x,y) \longmapsto (\frac{1}{5}x, y)$

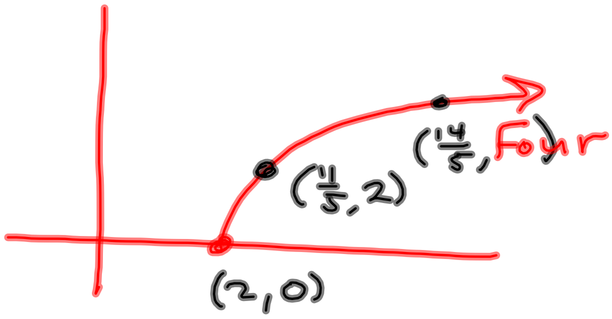
$\longrightarrow 2\sqrt{5x}$

$2f(5x)$

$(x,y) \longmapsto (\frac{1}{5}x, 2y)$



$\longrightarrow 2\sqrt{5(x-2)}$



$\frac{1}{5} + 2 = \frac{1+10}{5} = \frac{11}{5}$

$\frac{4}{5} + 2 = \frac{4+10}{5} = \frac{14}{5}$

$\sqrt{x}$ gets to $y=1$ when $x=1$

$\sqrt{5x}$ " " $y=1$ when $5x=1$

$\sqrt{5(\frac{1}{5})} = \sqrt{1}$

Quiz Friday over 2.1–2.5

2.1–2.3 just a graph like last quiz's.

2.4 $f(x) = 3x-1$, $g(x) = x^2+1$, $h(x) = \frac{x+1}{3}$

45 $(f \circ g \circ h)(2)$

$= f(g(h(2))) = f(g(\frac{2+1}{3})) = f(g(1))$

$= f(1^2+1) = f(2) = 3(2)-1 = 5$

$(f \circ g \circ h)(\beta) = f(g(h(\beta)))$

$= f(g(\frac{\beta+1}{3})) = f((\frac{\beta+1}{3})^2+1)$

$= 3((\frac{\beta+1}{3})^2+1) - 1$

#s 63-72 & 73-80 just treat as follows: Ignore $f(x)=|x|$, etc. Treat like #s 73-80

write $h(x)$ as a composition

$h(x) = (f \circ g)(x)$

$h(x) = \sin(x^2 - 5x)$

Let $f(x) = \sin x$ and
$g(x) = x^2 - 5x$. Then

$f(g(x)) = f(x^2-5x) = \sin(x^2-5x)$

$h(x) = (x^3+2x)^{5/3}$ Sometimes it helps to write $f(u)$ instead of $f(x)$:

$f(u) = u^{5/3}$ Lamé

$u = g(x) = x^3+2x$ $\boxed{= u(x)}$

$f(u) = u^{5/3}$

$f(u(x)) = (u(x))^{5/3} = (x^3+2x)^{5/3} = h(x)$

81 $y = 2z - 3$ & $z = 3x+1$ $\Longrightarrow$

$y = 2(3x+1) - 3$

Sep 26-10:35 AM

2.5 - Find $f^{-1}(x)$

$f(x) = 3x-7 = y$

$x = 3y-7$

$3y-7 = x$

$3y = x+7$

$y = \frac{x+7}{3}$

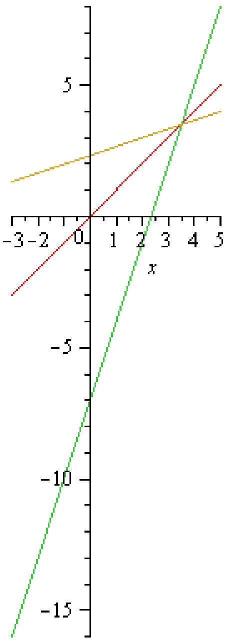
$f(x) = \sqrt{3x-1} = y$

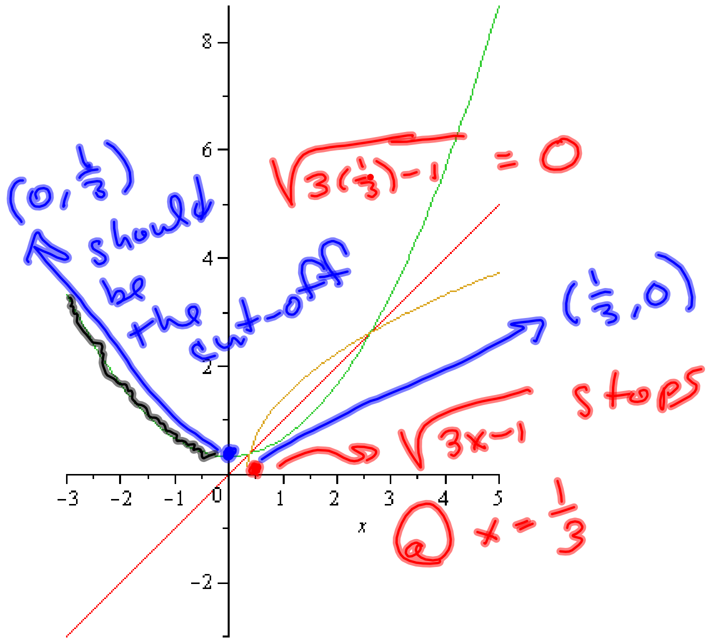
$\sqrt{3y-1} = x$

$3y-1 = x^2$

$3y = x^2+1$

$y = \frac{x^2+1}{3}$





$\frac{x^2+1}{3}$ is NOT 1-to-1.

Need to cut it of at $x=0, y=\frac{1}{3}$

Sep 26-10:45 AM

$\frac{x^2+1}{3} = \frac{x^3}{3} + \frac{1}{3}$ is not 1-to-1,

but it arises as an inverse for

$\sqrt{3x-1}$

In the book, you'll see restrictions on $f(x) = ax^2+bx+c$ to MAKE $f(x)$ 1-to-1.

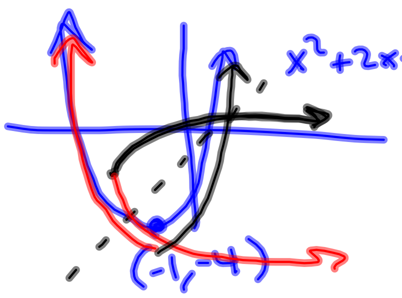
$f(x) = x^2+2x-3$

$= x^2+2x+1^2-1^2-3$

$\frac{2}{1} = 1 \rightarrow 1^2$

$= (x+1)^2-4$ is 1-to-1 if we choose $x \geq -1$ OR $x \leq -1$

$x=-1$ is its "axis of symmetry"



Keep $x \geq -1$ & it's 1-to-1.

we find $f^{-1}(x)$ for $f(x) = x^2+2x-3$
$= (x+1)^2-4$

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

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

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

Sep 26-10:55 AM

$$|y+1| = \sqrt{x+4}$$

$$y+1 = \pm\sqrt{x+4}$$

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

which do
<u>we</u> want?

Something
Like this
on Quiz 7
(a week from
Friday)

$\sqrt{x+4} - 1$ OR

$-\sqrt{x+4} - 1$

Want <u>this</u>.

Sep 26-11:04 AM