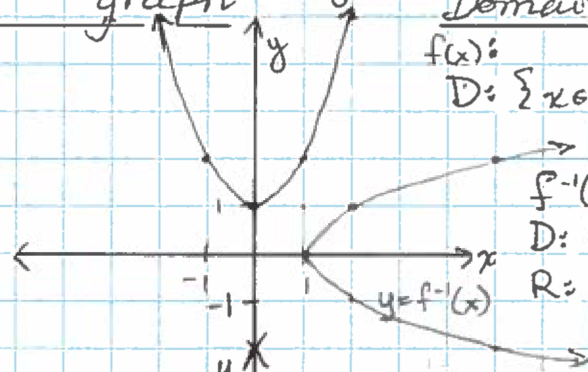
10) $f(x)$ | $f^{-1}(x)$ | graph | Domain, Range

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

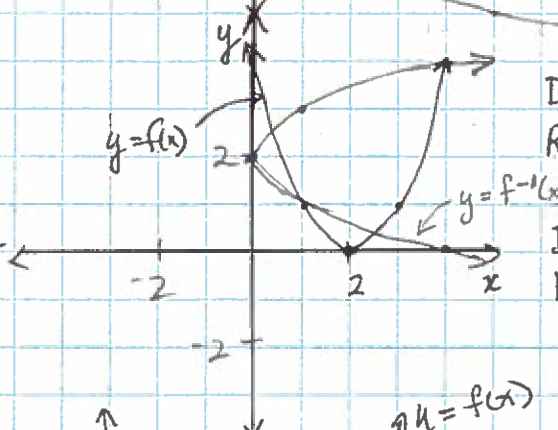
$y=x^2+1$
$x=y^2+1$
$y^2=x-1$
$y=\pm\sqrt{x-1}$
$f^{-1}(x)=\pm\sqrt{x-1}$



$f(x)$:
D: $\{x\in\mathbb{R}\}$ R: $\{y\in\mathbb{R}\mid y\geq 1\}$
$f^{-1}(x)$:
D: $\{x\in\mathbb{R}\mid x\geq 1\}$
R: $\{y\in\mathbb{R}\}$.

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

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

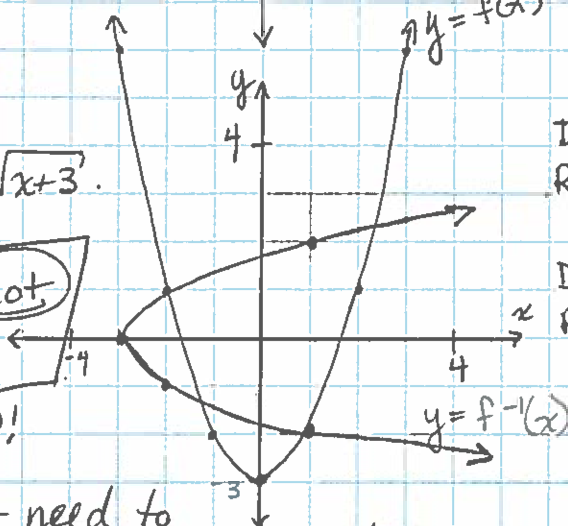


$f(x)$:
D: $\{x\in\mathbb{R}\}$
R: $\{y\in\mathbb{R}\mid y\geq 0\}$
$f^{-1}(x)$:
D: $\{x\in\mathbb{R}\mid x\geq 0\}$
R: $\{y\in\mathbb{R}\}$

12. a) $y=x^2-3$
for $f^{-1}(x)$: $f^{-1}(x)=\pm\sqrt{x+3}$.

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

this is not $y=\sqrt{x}+3$
So, NO!



$f(x)$:
D: $\{x\in\mathbb{R}\}$
R: $\{y\in\mathbb{R}\mid y\geq -3\}$
$f^{-1}(x)$:
D: $\{x\in\mathbb{R}\mid x\geq -3\}$
R: $\{y\in\mathbb{R}\}$.

Oops! ... Didn't need to do all of this (I thought I was still on #10).

b) $y=x^2+1$
for $f^{-1}(x)$,
$x=y^2+1$
$x-1=y^2$
$y=\pm\sqrt{x-1}$

$f^{-1}(x)=\pm\sqrt{x-1}$
this is NOT $y=\sqrt{x+1}$
So, NO!

13c) $y = 3(x-2)$

$y = 3x - 6$

for $f^{-1}(x)$

$x = 3y - 6$

$x + 6 = 3y$

$\frac{x+6}{3} = y$

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

$f(x)$: D: $\{x \in \mathbb{R}\}$

R: $\{y \in \mathbb{R}\}$

$f^{-1}(x)$: D: $\{x \in \mathbb{R}\}$

R: $\{y \in \mathbb{R}\}$.

13g) $y = x^2 - 4$

for $f^{-1}(x)$:

$x = y^2 - 4$

$y^2 = x + 4$

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

↳ not a function.

14 iv) $f(x) = 3 - x^2$, $x \geq 0$ ← They are "restricting" the domain by giving this in the question.

a) for $f^{-1}(x)$,

$x = 3 - y^2$, $y \geq 0$

$x - 3 = -y^2$

$-x + 3 = y^2$

$y = \pm\sqrt{-x+3}$ → $f^{-1}(x) = \pm\sqrt{-x+3}$ ← given in question.

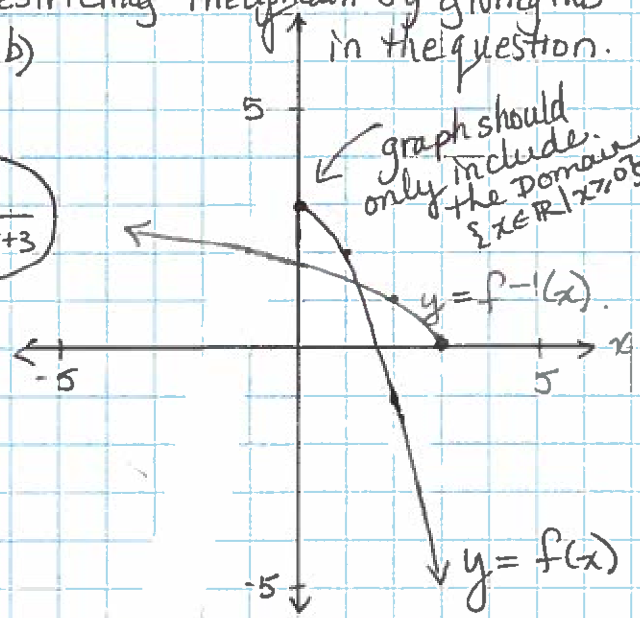
c) $f(x)$: D: $\{x \in \mathbb{R} \mid x \geq 0\}$

R: $\{y \in \mathbb{R}\}$

$f^{-1}(x)$: D: $\{x \in \mathbb{R}\}$

R: $\{y \in \mathbb{R} \mid y \geq 0\}$

b)



vi) $f(x) = (x+3)^2$, $x \leq -3$

a) for $f^{-1}(x)$,

$x = (y+3)^2$, $y \leq -3$

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

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

$\therefore f^{-1}(x) = \pm\sqrt{x} - 3$ BUT $y \leq -3$ so given in question

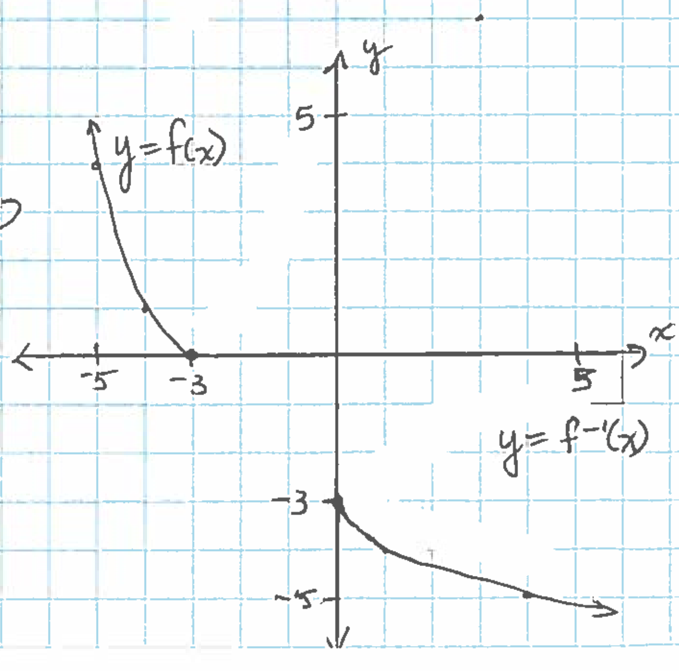
$\boxed{f^{-1}(x) = -\sqrt{x} - 3}$

c) $f(x)$: D: $\{x \in \mathbb{R} \mid x \leq -3\}$

R: $\{y \in \mathbb{R} \mid y \geq 0\}$

$f^{-1}(x)$: D: $\{x \in \mathbb{R} \mid x \geq 0\}$

R: $\{y \in \mathbb{R} \mid y \leq -3\}$



Pg 215 #15b (22, 23)

$3 - x \geq 0$
$3 \geq x$

15b $y = \sqrt{3-x}$ D: $\{x \in \mathbb{R} \mid x \leq 3\}$
R: $\{y \in \mathbb{R} \mid y \geq 0\}$

for $f^{-1}(x)$,

$\sqrt{3-y} = x$

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

$\therefore f^{-1}(x) = -x^2 + 3$
D: $\{x \in \mathbb{R} \mid x \geq 0\}$
R: $\{y \in \mathbb{R} \mid y \leq 3\}$

22. a) Let s be the sales price, let p be the original price, both in dollars.
$s = 0.7p$
$y = 0.7x$

b) for $f^{-1}(x)$,
$x = 0.7y$
$\frac{x}{0.7} = y$
$y = \frac{x}{\frac{7}{10}}$
$y = x \times \frac{10}{7}$
$y = \frac{10x}{7}$
$\therefore f^{-1}(x) = \frac{10x}{7}$

or $p = \frac{10s}{7}$

c) the inverse expresses the original price as a function of the sales price. (Given sales price, it allows you to find the original price).

23. a) $c = 0.7u$
so, $u = \frac{c}{0.7}$
$u = \frac{10c}{7}$ or $u \doteq 1.43c$

* error in text.

b) the inverse is
$c = 0.7u$

$c = 0.7(150)$
$= \$105$
$\therefore$ the \$150 US is worth \$105 Cdn.