p 073 q5(b)

5. Sketch the graph of each function using transformations. State the domain and range of each function.

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

b) $r(x) = 3\sqrt{x+1}$

c) $p(x) = -\sqrt{x-2}$

d) $y - 1 = -\sqrt{-4(x-2)}$

e) $m(x) = \sqrt{\frac{1}{2}x} + 4$

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

take a look at the previous solution p 073 q5(a)

for extra detail, here we move faster...

$r(x) = 3\sqrt{x+1}$

again the baseline parent function is $f(x) = \sqrt{x}$

must express as $f(x)$

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

$\therefore \; r(x) = 3 \cdot f(x+1)$

(*) vertical stretch by a factor of 3.

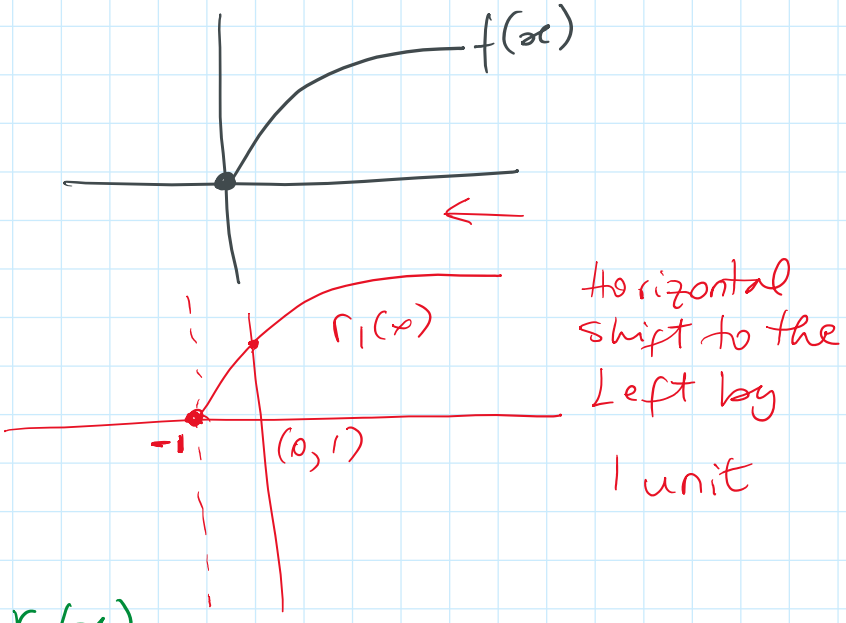
(**) horizontal shift to the left by 1 unit

Theory: like before, we have 2 transformations operating in 2 separate axes: the ~~horizontal~~ (**) and the vertical (*), these two do not interfere w/ each other, so they can happen in any order. That means we can sketch (*) first or the (**) transformation first.

Here is the proof, https://www.desmos.com/calculator/3d9d8gyngm

I will sketch the ~~H~~ shift 1st, then the ~~V~~ stretch

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



$r_1(x) = f(x+1)$

We take this result $r_1(x)$

and we stretch it vertically by a factor of 3

the mapping would be $(x, y) \rightarrow (x, 3y)$

$r_2(x) = 3 \cdot r_1(x)$

(x, y) in $r_1(x)$; $(x, 3y)$ in $r_2(x)$

A few calculation will be usefull for our table of values

$r_1(0) = f(0+1) = f(1) = \sqrt{1} = 1$ *

$r_1(3) = f(3+1) = f(4) = \sqrt{4} = 2$ **

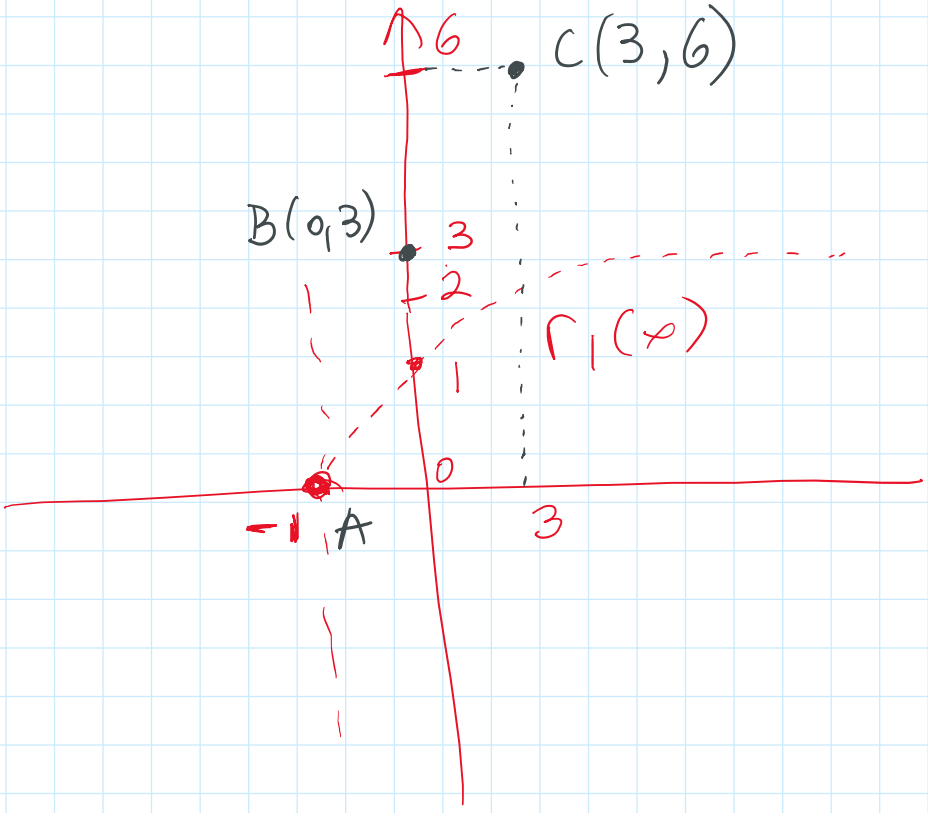
quick table of values

x	$r_1(x)$	$r_2(x) = 3r_1(x)$	$(x, r_2(x))$ the same as $r(x)$	name the point
-1	0	$3 \cdot 0 = 0$	$(-1, 0)$	A ← this is the origin, notice it stays the same as it was in $r_1(x)$
0	1 *	$3 \cdot 1 = 3$	$(0, 3)$	B
3	2 **	$3 \cdot 2 = 6$	$(3, 6)$	C

3	2	3.2 = 6	(3, 6)	C

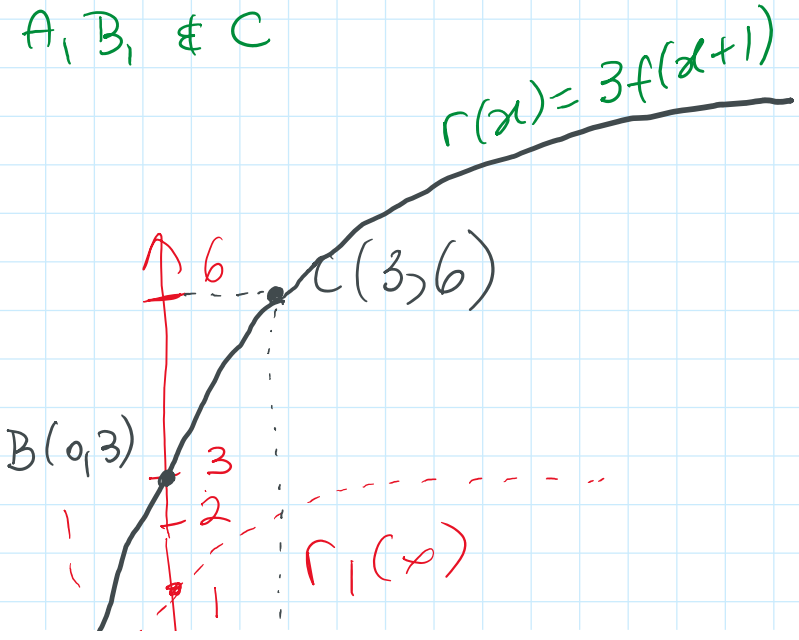
same as ... was in $r_1(x)$

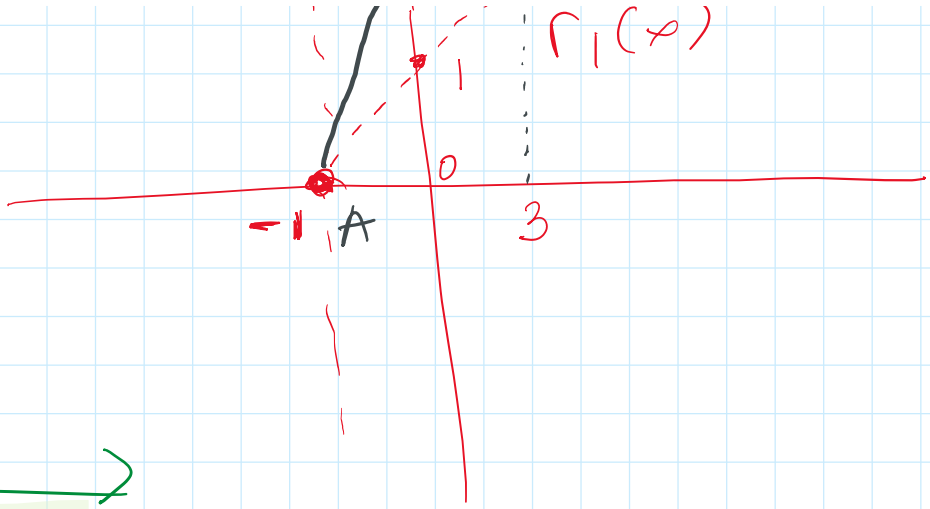
Figure out $r(x) = r_2(x)$ in relation to $r_1(x)$ based on the above table:

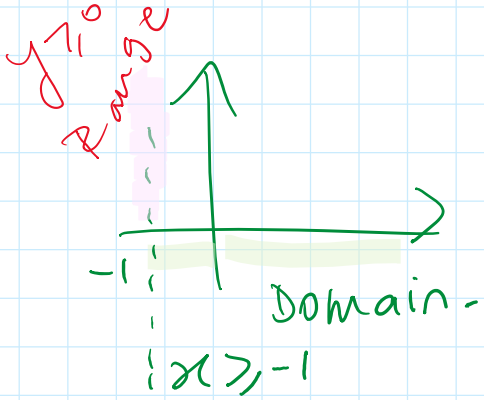


Force your stretch to move through the calculated points A, B, & C

The answer is sketched in black







$$D_f = \{x \mid x \geq -1, x \in \mathbb{R}\}$$

$$R_f = \{y \mid y \geq 0, y \in \mathbb{R}\}.$$