121 §2.3 #s 1–10, 35–39, 41, 42, 45, 48, 50, 53, A, B, C, D

#s 35–44 Write the equation for the resulting graph.

(35) $f(x) = \sqrt{x}$; translated up 2

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

(36) $f(x) = \sqrt{x}$; moved down 3.

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

(37) $y = f(x) = x^2$; translated 5 units to the right

$f(x-5) = (x-5)^2$ (Delay)

(38) $y = f(x) = x^2$; moved seven units left.

$f(x+7) = (x+7)^2$ (Advance)

(39) $y = f(x) = x^2$; moved 10 right, 4 up.

$f(x-10) + 4 = (x-10)^2 + 4$ (Delay)

Right 10 ↑ up 4

$= f(x) =$

(40) $y = \sqrt{x}$; moved 5 left and 12 down

$f(x+5) - 12 = \sqrt{x+5} - 12$

'21 §2.3

(41) $y = \sqrt{x} = f(x)$ is stretched by a factor of 3, translated 5 up and then reflected in x-axis

↳ over across thru

$-3f(x) + 5 = \boxed{-3\sqrt{x} + 5}$

Reflect Vertical stretch up

(42) $f(x) = x^2$ 13 right, 6 down, reflect vertical

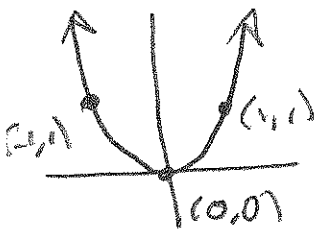
$-f(x-13) - 6 = -\sqrt{x-13} - 6$

(42)* ~~Same, but make it 13 right, 6 down~~ Nah

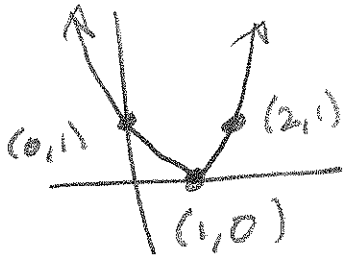
#s 45-60 use transformations to graph each function. State $\mathcal{D}$ & $\mathcal{R}$

(45) $g(x) = (x-1)^2 + 2$

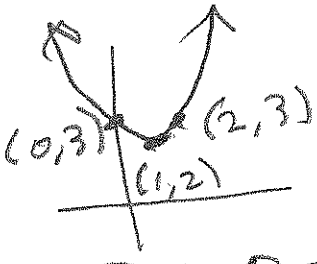
$f(x) = x^2$



$f(x-1) = (x-1)^2$



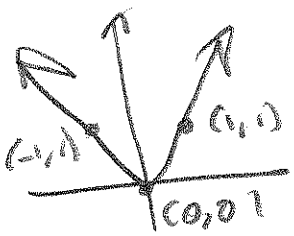
$f(x-1) + 2 = (x-1)^2 + 2$



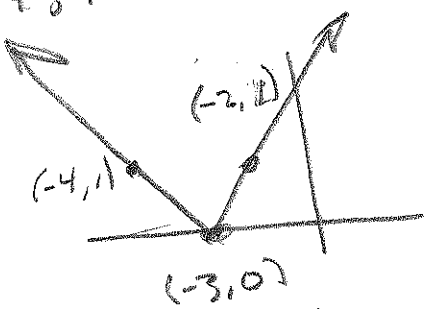
$\mathcal{D} = \mathbb{R}$; $\mathcal{R} = [2, \infty)$

121 §2.3

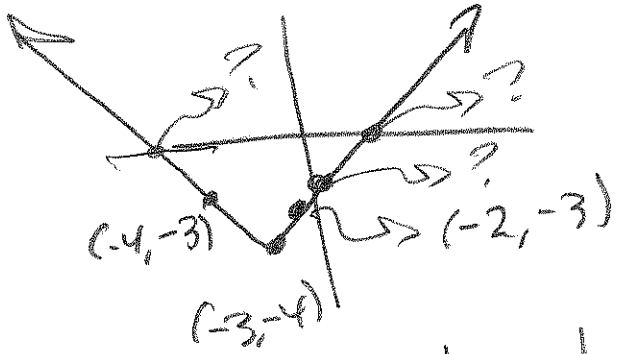
(48) $y = |x+3| - 4$



$f(x) = |x|$



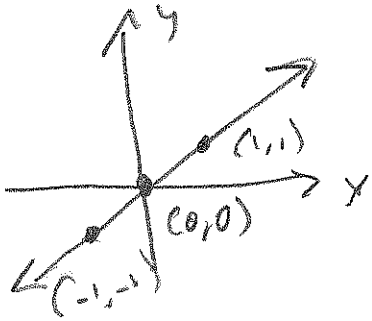
$f(x+3) = |x+3|$



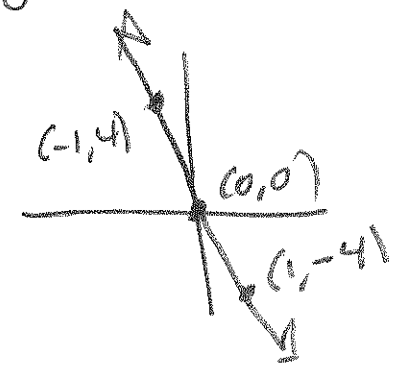
$f(x+3) - 4 = |x+3| - 4$

$D = \mathbb{R}$; $R = [-4, \infty)$

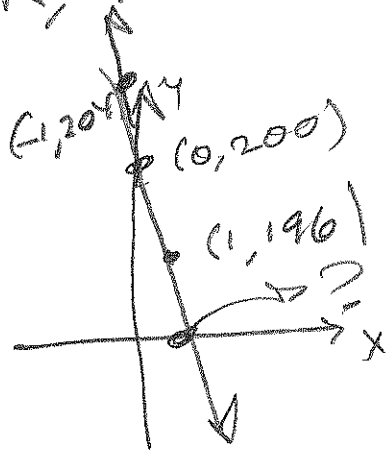
(50) $g(x) = -4x + 200$



$f(x) = x$



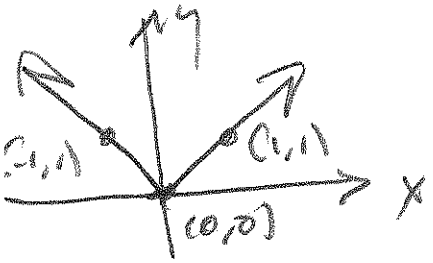
$-4f(x) = -4x$



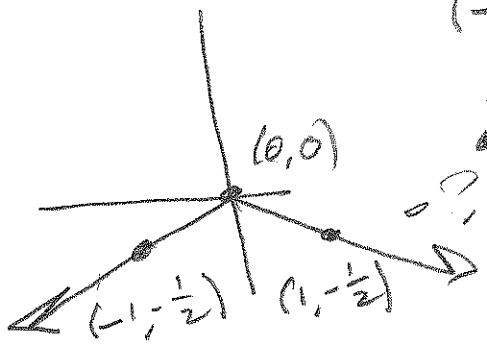
$-4f(x) + 200 = -4x + 200$

$D = R = \mathbb{R}$

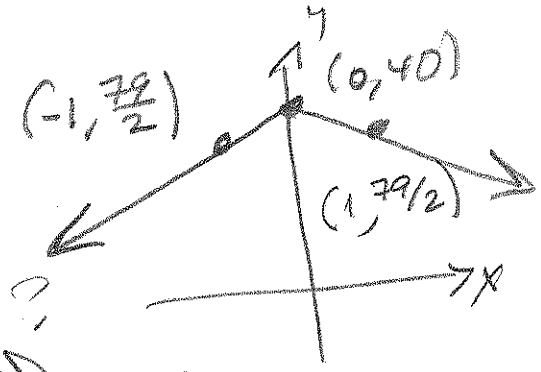
(53) $y = -\frac{1}{2}|x| + 40$



$f(x) = |x|$



$-\frac{1}{2}f(x) = -\frac{1}{2}|x|$

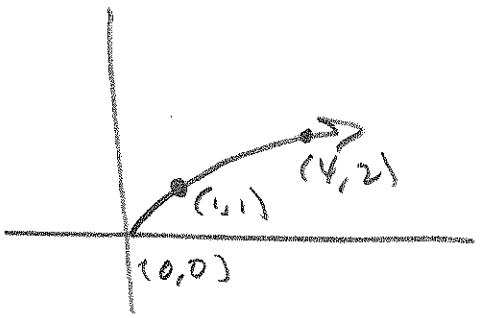


$D = \mathbb{R}$;

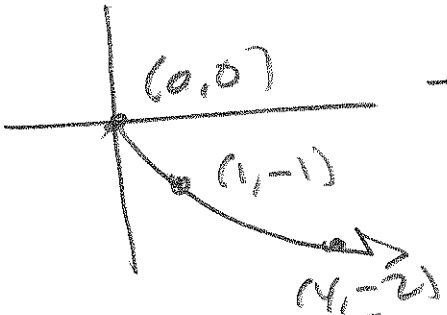
$R = (-\infty, 40]$

121 §2.3

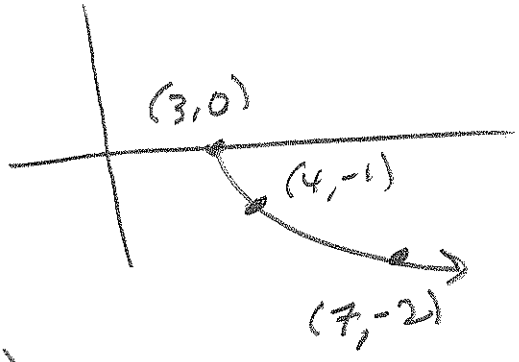
(57) $y = -\sqrt{x-3}$



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



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



$-f(x-3)$

$= -\sqrt{x-3}$

$D = [3, \infty)$

$R = (-\infty, 0]$

*s 58-60 also good.

I ALSO want to see

(A) $g(x) = -2\sqrt{6-3x} + 5$

(B) $g(x) = -2(6-3x)^2 + 5$

(C) $g(x) = -2\sqrt[3]{6-3x} + 5$

(D) $g(x) = 5\sqrt{-2x+6} - 3$

121 S 2.3

(A) $g(x) = -2\sqrt{6-3x} + 5$

$= -2\sqrt{-3(x-2)} + 5$

$6-3x = -3x+6$

$= -3(x-2)$

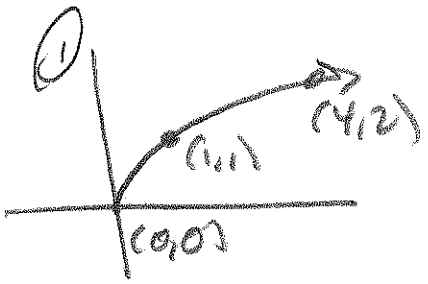
① $\sqrt{x}$

② $-2\sqrt{x}$

③ $-2\sqrt{-3x}$

④ $-2\sqrt{-3(x-2)}$

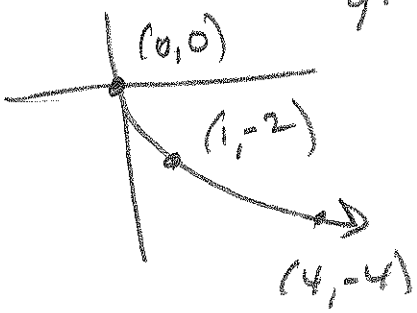
⑤ $-2\sqrt{-3(x-2)} + 5$



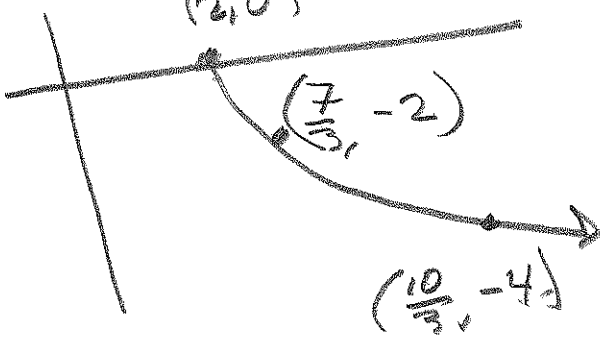
$f(x) = \sqrt{x}$

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

$y \longmapsto 2y$

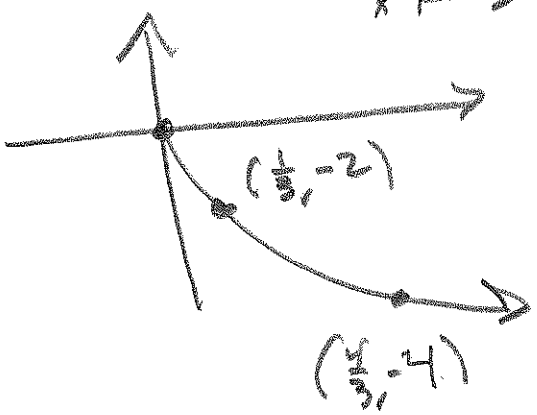


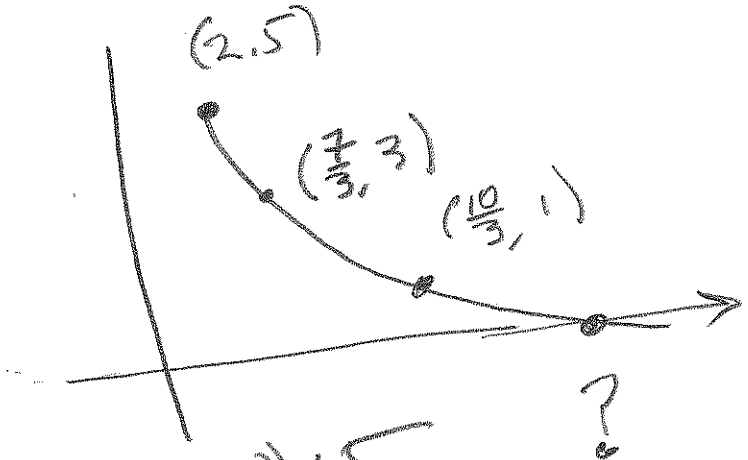
(4) $-2f(-3(x-2))$



(3) $-2f(-3x) = -2\sqrt{-3x}$

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





$-2f(-3(x-2)) + 5$

$D = [2, \infty)$

$R = (-\infty, 5]$

121 S 2.3

(B) $g(x) = -2(6-3x)^2 + 5$

Trick with squares, even powers, and absolute value: y-axis symmetry:

$(6-3x)^2 = ((-1)(3x-6))^2 = (-1)^2(3x-6)^2 = (3x-6)^2$

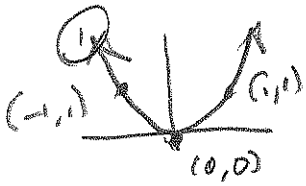
$|6-3x| = |3x-6|$

$(6-3x)^{26} = (3x-6)^{26}$

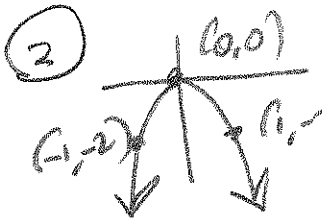
Saves us one step, basically.

$-2(6-3x)^2+5 = -2(3x-6)^2+5 = -2(3(x-2))^2+5$

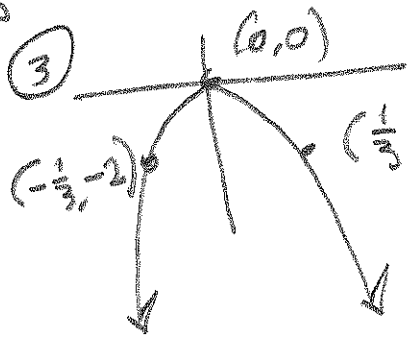
$x^2 \xrightarrow{1} -2x^2 \xrightarrow{2} -2(3x)^2 \xrightarrow{3} -2(3(x-2))^2 \xrightarrow{4} -2(3(x-2))^2+5$



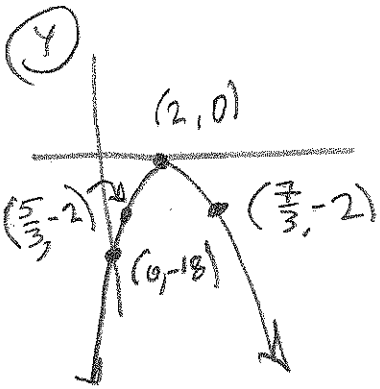
$x^2 = f(x)$



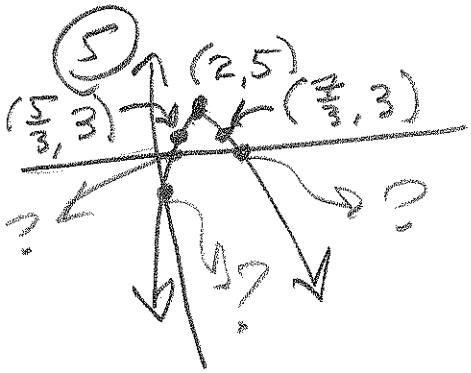
$-2x^2 = -2f(x)$



$-2(3(x-2))^2+5$



$-2(3(x-2))^2$



$-2(3(x-2))^2+5$

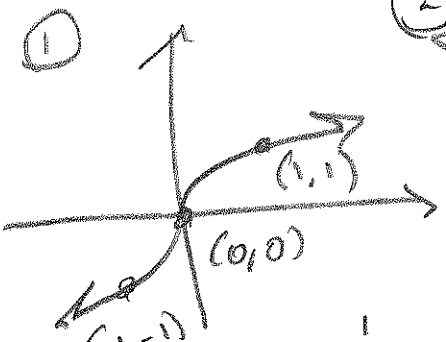
$= -2f(3(x-2))+5$

121 §2.3

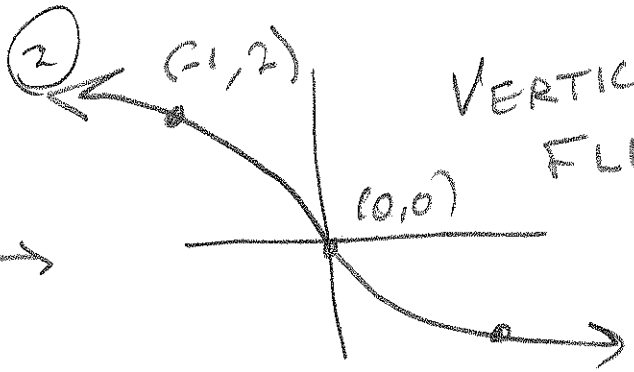
(C) $g(x) = -2\sqrt[3]{6-3x} + 5$

① $\sqrt[3]{x}$ ↦ ② $-2\sqrt[3]{x}$ ↦ ③ $-2\sqrt[3]{-3x}$

↦ ④ $-2\sqrt[3]{-3(x-2)}$ ↦ ⑤ $-2\sqrt[3]{-3(x-2)} + 5$



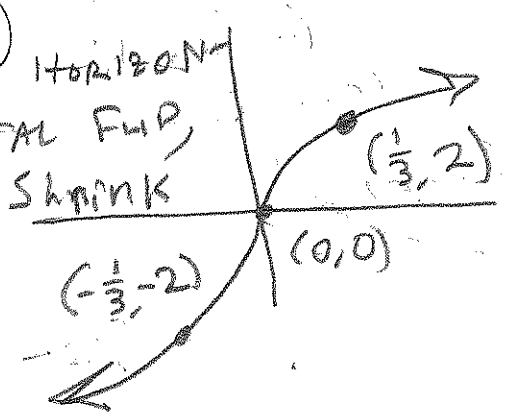
$f(x) = \sqrt[3]{x} = x^{\frac{1}{3}}$



VERTICAL FLIP, stretch.

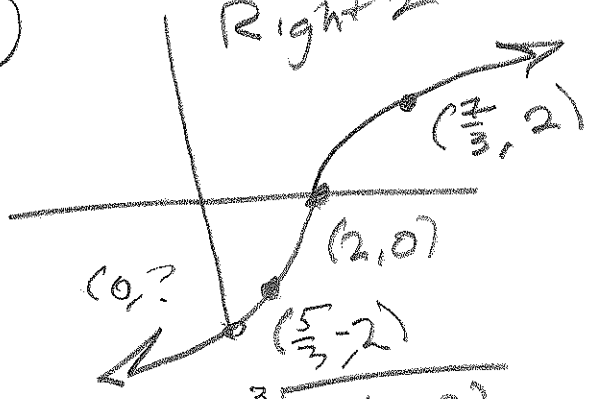
$-2\sqrt[3]{x} = -2f(x)$

③ HORIZONTAL FLIP, Shrink



$-2\sqrt[3]{-3x}$

④ Right 2



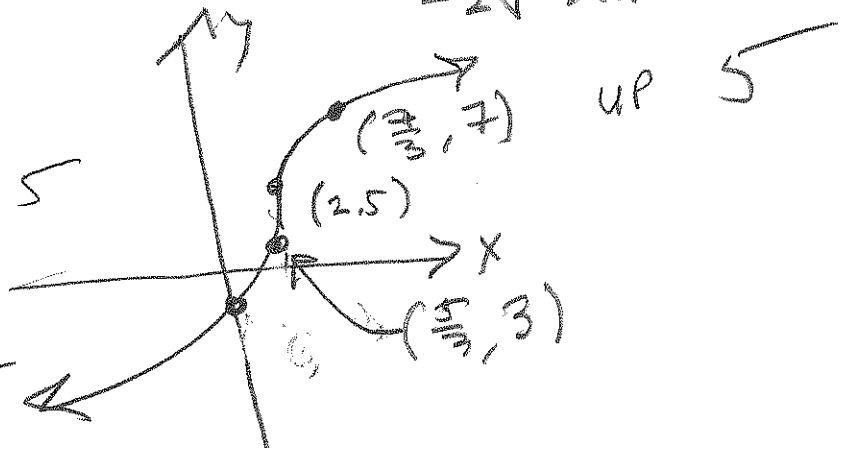
$-2\sqrt[3]{-3(x-2)}$

⑤ $-2\sqrt[3]{6-3x} + 5$

$= g(x)$

$= -2f(-3(x-2)) + 5$

$= -2f(6-3x) + 5$



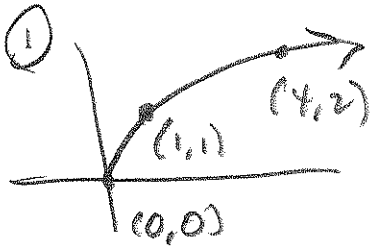
121 §2.3

(8) $g(x) = 5\sqrt{-2x+6} - 3$

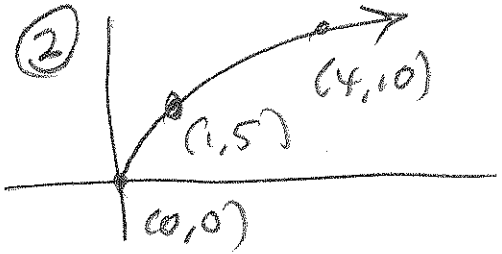
Scratch: $-2x+6 = -2(x-3)$

$\sqrt{x} \longmapsto 5\sqrt{x} \longmapsto 5\sqrt{-2x} \longmapsto 5\sqrt{-2(x-3)}$

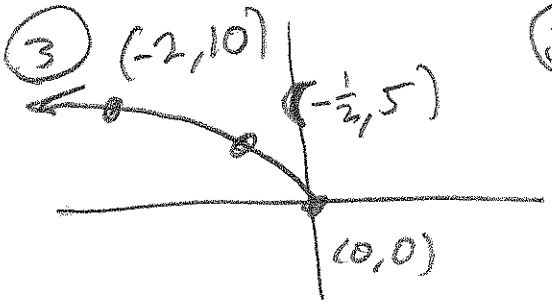
$\longmapsto 5\sqrt{-2(x-3)} - 3$



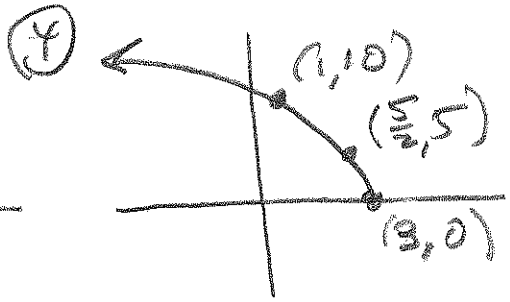
$f(x) = \sqrt{x}$



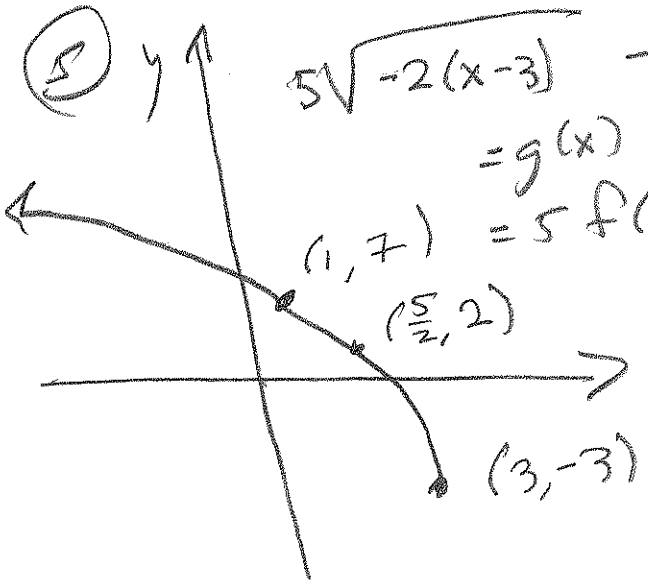
$5f(x) = 5\sqrt{x}$



$5\sqrt{-2x}$



$5\sqrt{-2(x-3)}$



$5\sqrt{-2(x-3)} - 3$

$= g(x)$

$= 5f(-2(x-3)) - 3$

$D = (-\infty, 3]$

$R = [-3, \infty)$