Chapter 1 review answers
Section 1.2 – 1.3

1.
(a) defines a function domain: {a,b,c,d,e} range: {10, 20, 30, 40, 50}
(b) defines a function domain: {1,2,3,4,5} range: {10, 11, 15}
(c) does not define a function,
since 7 (a value from the domain) corresponds to to values from the range: 10 and 15
domain: {1, 5, 6, 7, 8} range: {5, 10, 13, 15, 16, 21}

2.
(a) yes, it does (b) yes, it does (c) no, it does not

(d) no, it does not (e) yes, it does

3.
(a) $f(0) = -17$ $f(x-7) = 10x - 87$ $f(x+2h) = 10x + 20h - 17$
(b) $g(0) = 7$ $g(x-1) = 2x^2 - 9x + 14 g(x+h) = 2x^2 + 4xh + 2h^2 - 5x - 5h + 7$
(c) $h(1) = -8$ $h(7) = 0$ $h(14) = \sqrt{7}$ $h(50) = 4$

4.
(a) $\frac{f(x+h)-f(x)}{h}=0$ (b) $\frac{f(x+h)-f(x)}{h}=2$ (c) $\frac{f(x+h)-f(x)}{h}=-2x-h+2$

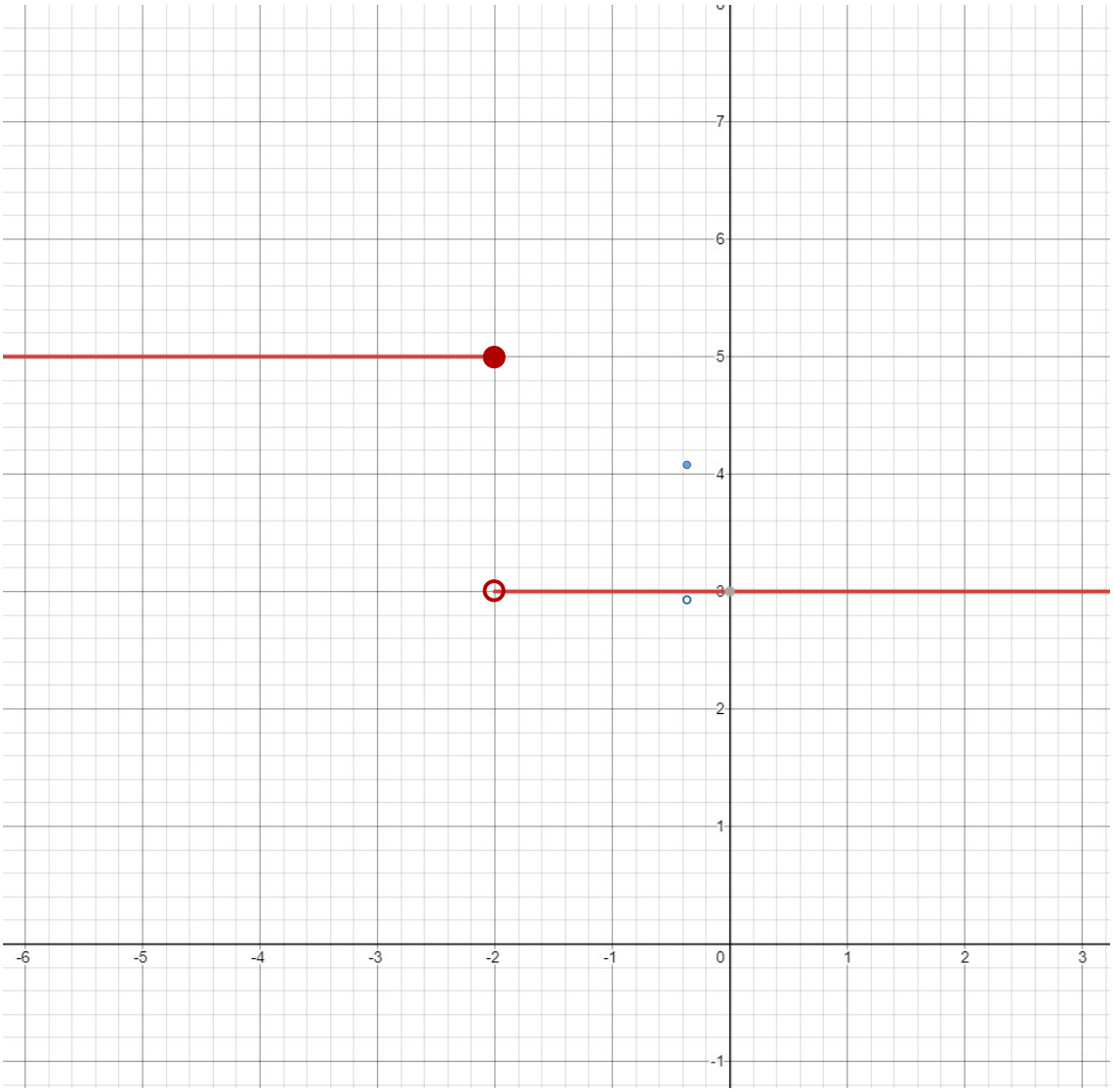
5.
(a) not a function (b) a function (c) a function
(d) not a function (e) a function (f) not a function

6.
(a) domain: [-4, 3)
range: [-2,-1) ∪ [1,2]
x-intercepts: none
y-intercept: 1
increasing: (-4,-1) ∪ (1,2)
decreasing: (2,3)
constant: (-1,1)
relative maximum: 2
relative minimum: none
absolute maximum: 2
absolute minimum: -2
f(-1) = 1
f(2) = 2
f(0) – f(-4) = 1 - (-2) = 3

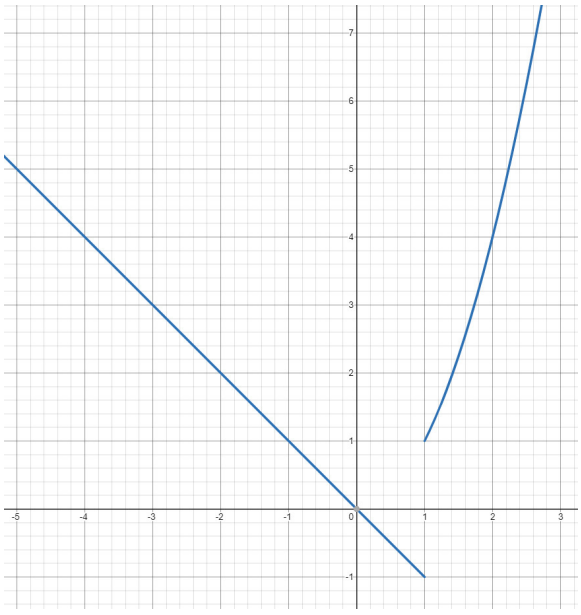
(b) domain: (-∞,∞)
range: [-2, ∞)
x-intercepts: -4, -2, 2, 4
y – intercept: 4
increasing: (-3, 0) ∪ (3, ∞)
decreasing: (-∞,-3) ∪ (0, 3)
constant: none
relative maximum: 4
relative minima: -2, -1
absolute maximum: doesn't have
absolute minimum: -2
f(2) = 0
f(-4) = 0

7.
(a) odd (b) even (c) neither (d) even (e) odd (f) neither

8. (a)

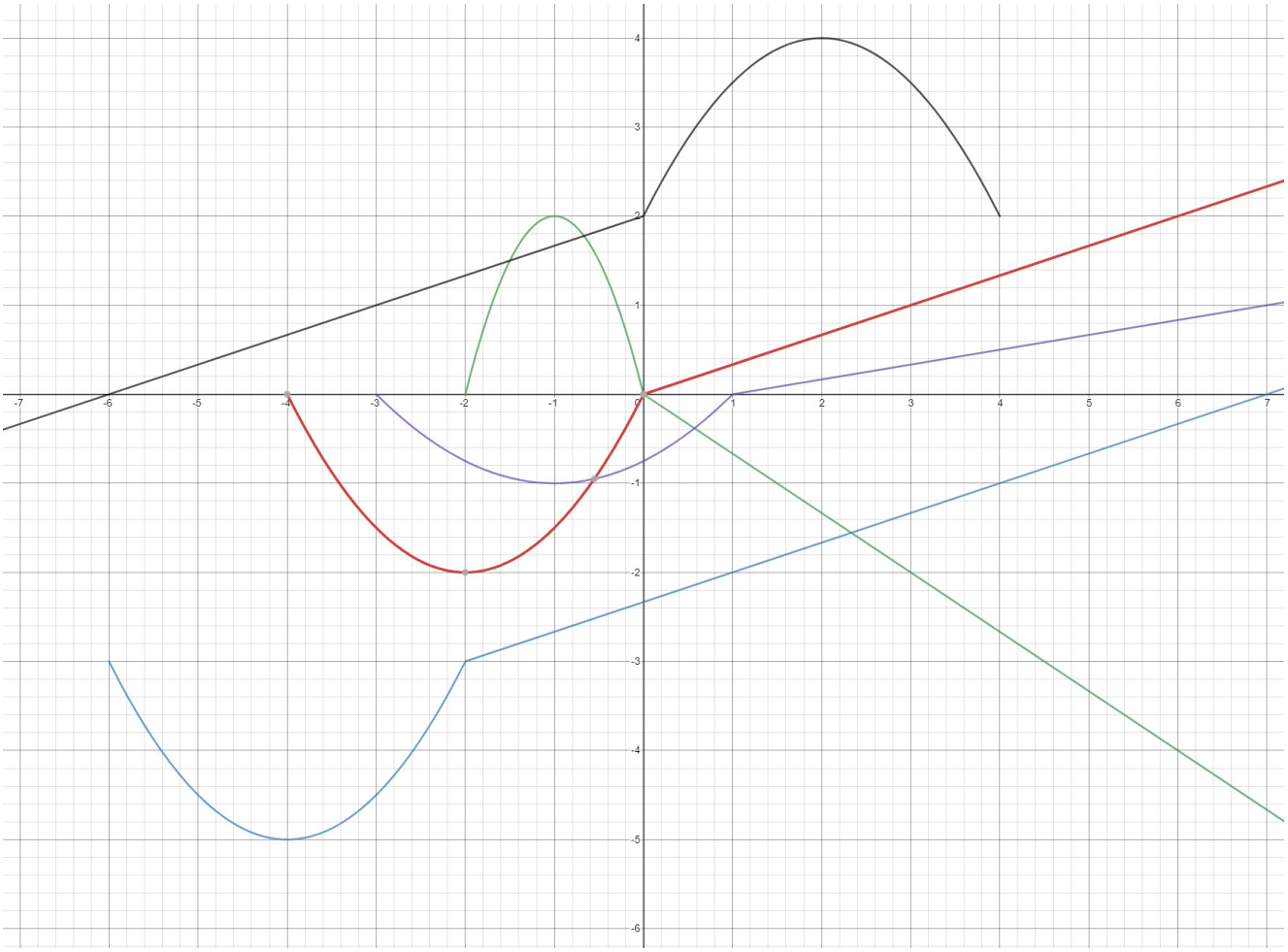


(b)

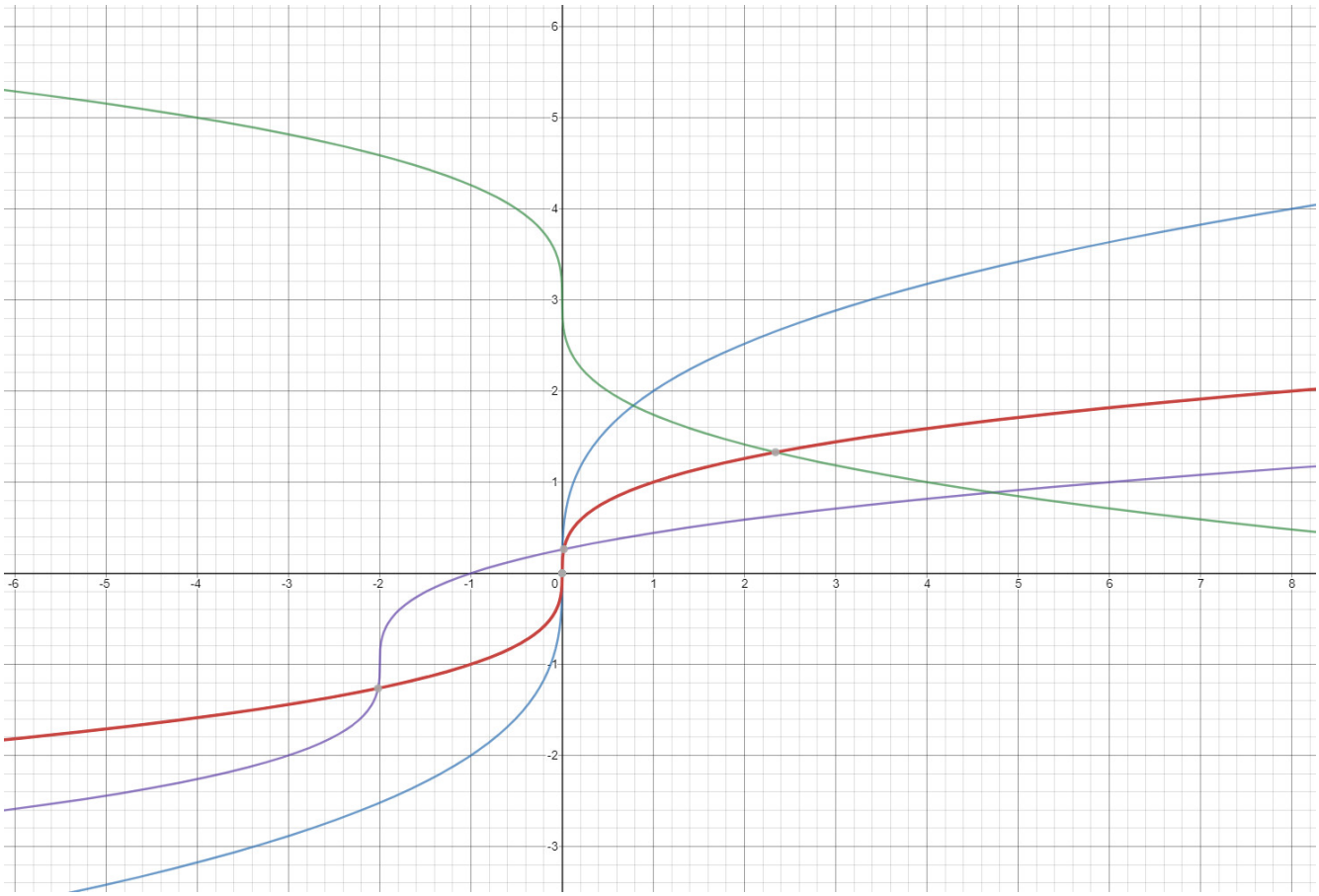


Sections 1.6 – 1.8

1. original graph is in red
(a) vertical shift 3 units down, horizontal shift 2 units left (graph in blue)
(b) horizontal compression (every x-coordinate value is multiplied by ½) and vertical reflection (about x-axis) (graph in green)
(c) horizontal shift 1 unit right, vertical compression (every y-coordinate value is multiplied by ½) (graph in purple)
(d) vertical reflection (about x-axis), horizontal reflection (about y-axis), vertical shift 2 units up (graph in black)



2. graph in red: graph of $\sqrt[3]{x}$
(a) horizontal shift 2 units left, vertical shift 1 unit down: graph is purple
(b) horizontal stretching (multiply by ½ every x-coordinate value), reflection about the x-axis (vertical reflection), vertical shift 3 units up: graph in green
(c) reflection about y-axis (horizontal reflection), vertical stretching (every y-value multiplied by 2), and reflection about x-axis (vertical reflection): graph in blue



3.
(a) all real numbers, i.e. **R** or (-∞,∞)
(b) all real numbers, i.e. **R** or (-∞,∞)
(c) (-∞,10]
(d) (5,∞)
(e) the function is undefined
(f) (-∞,-7) ∪ (-7,3) ∪ (3, ∞)

4.

(a) $(f+g)(x) = 2x + 3$ $(f-g)(x) = 4x-7$ $(g-f)(x) = -4x + 7$
$(fg)(x) = -3x^2 + 15x – 10$
domain of all the above functions is the set of all real number **R** or $(- \infty, \infty)$
$(f/g)(x) = (3x-2) / (5-x)$, domain: $(- \infty,5) \cup (5, \infty)$

(b) $(f+g)(x) = 2x^2 – x$ $(f-g)(x) = 2x^2 - 4x+2$ $(g-f)(x) = -2x^2 + 4x – 2$
$(fg)(x) = 2x^3 – 5x^2 + 4x – 1$
domain of all the above functions is the set of all real number **R** or $(- \infty, \infty)$
$(f/g)(x) = (2x^2 – 3x + 1) / (x-1) = 2x – 1$, domain: $(- \infty, 1) \cup (1, \infty)$

(c) $(f+g)(x) = \sqrt{x+7}+\sqrt{x-5}$ $(f-g)(x) = \sqrt{x+7}-\sqrt{x-5}$ $(g-f)(x) = \sqrt{x-5}-\sqrt{x+7}$
$(fg)(x) = \sqrt{x+7}\times\sqrt{x-5} = \sqrt{(x+7)(x-5)}$, if $x \geq 5$
domain of all the above functions: $[5, \infty)$
$(f/g)(x) = \dfrac{\sqrt{x+7}}{\sqrt{x-5}} = \dfrac{\sqrt{(x+7)(x-5)}}{(x-5)}$, domain: $(5, \infty)$

5.

(1) $(fog)(x) = 9x^2 – 6x + 4$ domain: all real numbers, i.e. **R** or $(-\infty,\infty)$
$(gof)(x) = 3x^2 + 8$ domain: all real numbers, i.e. **R** or $(-\infty,\infty)$
$(fog)(1) = 7$
$(gof)(3) = 35$

(2) $(fog)(x) = \sqrt{x+2}$ domain: $[-2, \infty)$
$(gof)(x) = \sqrt{x}+2$ domain: $[0, \infty)$
$(fog)(1) = \sqrt{3}$
$(gof)(3) = \sqrt{3}+2$

(3) $(fog)(x) = \dfrac{1-x}{1+2x}$ domain: $(-\infty,-1/2) \cup (-1/2, 0) \cup (0, \infty)$
$(gof)(x) = \dfrac{x+2}{x-1}$ domain: $(-\infty,-2) \cup (-2, 1) \cup (1, \infty)$
$(fog)(1) = 0$
$(gof)(3) = \dfrac{5}{2}$

6.

(a) no, they are not (b) yes, they are (c) yes, they are

7.

(a) $f^{-1}(x)=\dfrac{x-5}{3}$ (b) $f^{-1}(x)=x^3+2$ (c) $f^{-1}(x)=\dfrac{7}{x-2}$

8.

(a) has inverse (b) does not have an inverse (c) has inverse (d) doesn't have an inverse