(1) Book definitions

(2) We can represent a function algebraically (by a formula) or by a graph

(3) $f(x)$ is the output for the function f corresponding to an input x.

(4) $f(2) = -2\cdot 2^2 + 4\cdot 2 - 1 = -8 + 8 - 1 = \boxed{-1}$

$f(-1) = -2(-1)^2 + 4\cdot(-1) - 1 = -2 - 4 - 1 = \boxed{-7}$

$f(0) = -2\cdot 0^2 + 4\cdot 0 - 1 = \boxed{-1}$

$f(-x) = -2(-x)^2 + 4\cdot(-x) - 1 = \boxed{-2x^2 - 4x - 1}$

$f(x+1) = -2(x+1)^2 + 4(x+1) - 1 = -2(x^2+2x+1) + 4x + 4 - 1 = -2x^2 - \cancel{4x} - 2 + \cancel{4x} + 4 - 1$

$= \boxed{-2x^2 + 1}$

$f(x+h) = -2(x+h)^2 + 4(x+h) - 1 = \boxed{-2x^2 - 4xh - 2h^2 + 4x + 4h - 1}$

$f(2x) = -2(2x)^2 + 4(2x) - 1 = \boxed{-8x^2 + 8x - 1}$

(5)

a) $f(x) = \sqrt{4-2x}$

$4 - 2x \geq 0$

$4 \geq 2x$

$2 \geq x$

$\boxed{(-\infty, 2] \text{ or } \{x \mid x \leq 2\}}$

$5x-8$ ... and $2x+3 \geq 0$

b) $f(x) = \dfrac{5x-8}{\sqrt{2x+3} - 2}$

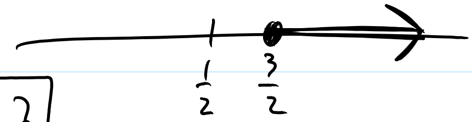
$\sqrt{2x+3} - 2 \neq 0$ and $2x+3 \geq 0$

$\sqrt{2x+3} \neq 2$ $\quad 2x \geq 3$

$2x+3 \neq 4$ $\quad x \geq 3/2$

$2x \neq 1$

$x \neq 1/2$



$\boxed{[3/2, \infty) \text{ or } \{x \mid x \geq 3/2\}}$

c) $f(x) = \dfrac{2}{x^2+2x-1}$

$x^2+2x-1 \neq 0$

using the quad. form: $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x \neq \dfrac{-2 \pm \sqrt{4-4\cdot 1\cdot(-1)}}{2}$

$x \neq \dfrac{-2 \pm \sqrt{8}}{2} = \dfrac{-2 \pm 2\sqrt{2}}{2} = \dfrac{-\cancel{2}}{\cancel{2}} \pm \dfrac{\cancel{2}\sqrt{2}}{\cancel{2}} = \boxed{-1 \pm \sqrt{2}}$

$\boxed{(-\infty, -1-\sqrt{2}) \cup (-1+\sqrt{2}, \infty) \quad \{x \mid x \neq -1 \pm \sqrt{2}\}}$

6

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

$\dfrac{f(x+h) - f(x)}{h} = \dfrac{-(x+h)^2 - 3(x+h) + 5 - (-x^2 - 3x + 5)}{h}$

$= \dfrac{\cancel{-x^2} - 2xh - h^2 \cancel{-3x} - 3h \cancel{+5} \cancel{+x^2} \cancel{+3x} \cancel{-5}}{h} = \dfrac{-2xh - h^2 - 3h}{h}$

$= \dfrac{\cancel{h}(-2x-h-3)}{\cancel{h}} = \boxed{-2x-h-3}$

$$= \frac{\cancel{h}(-2x-h-3)}{\cancel{h}} = \boxed{-2x-h-3}$$

6) $f(x) = \frac{3}{2x-1}$

$$\frac{f(x+h)-f(x)}{h} = \frac{\frac{3}{2(x+h)-1} - \frac{3}{2x-1}}{h} = \frac{\frac{3}{2(x+h)-1} \cdot \frac{2x-1}{2x-1} - \frac{3}{2x-1} \cdot \frac{2(x+h)-1}{2(x+h)-1}}{h}$$

$$= \frac{\frac{3(2x-1)-3(2(x+h)-1)}{(2(x+h)-1)\cdot(2x-1)}}{h/1}$$

$$= \frac{3(2x-1)-3(2(x+h)-1)}{(2(x+h)-1)\cdot(2x-1)} \cdot \frac{1}{h}$$

$$= \frac{6x-3-3(2x+2h-1)}{(2(x+h)-1)(2x-1)} \cdot \frac{1}{h} = \frac{\cancel{6x}-\cancel{3}-\cancel{6x}-6h+\cancel{3}}{h\cdot(2(x+h)-1)(2x-1)}$$

$$= \frac{-6\cancel{h}}{\cancel{h}(2(x+h)-1)(2x-1)} = \boxed{\frac{-6}{(2(x+h)-1)(2x-1)}}$$

7 $f(x) = \frac{2x-A}{3x+4}$, $f(1) = 7$

$$f(1) = \frac{2\cdot1-A}{3\cdot1+4} = 7$$

$$7 \cdot \frac{2-A}{7} = 7 \cdot 7$$

7

$$2-A=49$$
$$-A=47$$
$$\boxed{A=-47}$$

(8) in the book

(9) Using the vertical line test, only the first graph represents a function.

(11) $f(x)=x^2+x-1=0$ using the quadratic formula:

$$x=\frac{-1\pm\sqrt{1^2-4\cdot1\cdot(-1)}}{2\cdot1}=\frac{-1\pm\sqrt{5}}{2}$$

So the x-intercepts are $\boxed{\left(\frac{-1\pm\sqrt{5}}{2},0\right)}$ and the y-intercept is at $f(0)=-1$, i.e., $\boxed{(0,-1)}$

b) $f(x)=\dfrac{x^2-3}{\sqrt{2x+3}}$

y-int

$$f(0)=\frac{-3}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}=\frac{-\cancel{3}\sqrt{3}}{\cancel{3}}$$

x-int

$$f(x)=0$$

$$f(0) = \frac{-3}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-\cancel{3}\sqrt{3}}{\cancel{3}}$$

$$= -\sqrt{3}$$

$$\frac{x^2-3}{\sqrt{2x+3}} = 0$$

$$x^2 - 3 = 0$$

$$x^2 = 3$$

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

(13)

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

$$f(-x) = \frac{-x}{2(-x)^2+3} = \frac{-x}{2x^2+3} = -\frac{x}{2x^2+3} = -f(x) \Rightarrow \underline{f \text{ is odd}}$$

(14) a) $(-7, \infty)$ (or $(-7, 3)$)

b) $(-\infty, 8]$

c) $(-4, 0), (-2, 0), (2, 0)$

d) $(0, 8)$

e) $(-7, -5), (-5, 0)$

f) $(-5, -3), (0, \infty)$

g) $(-7, -4), (-2, 2)$

h) $(-4, -2), (2, \infty)$

i) <u>no</u>, it's not symmetric with the respect to the origin

j) $f(2) = 0$, $f(-5) = 3$, $f(0) = 8$, $f(1) = 6$

(16) $f(-3) = |-3+1| = 2$

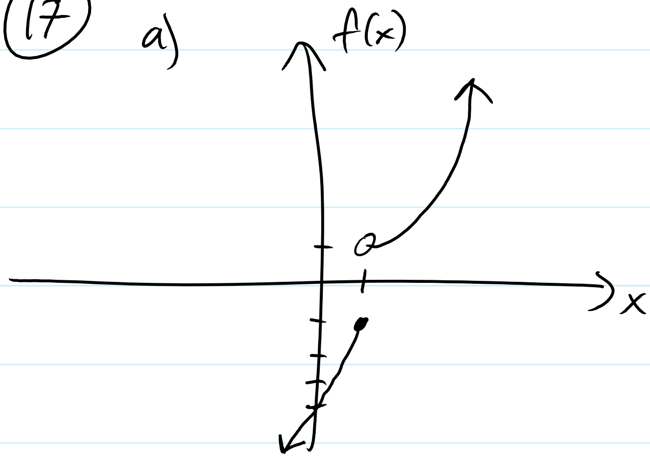
$f(-1) = \sqrt[3]{-1} = -1$

$f(0) = \sqrt[3]{0} = 0$

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

$f(5) = \frac{1}{5-3} = \frac{1}{2}$

(17) a)



b)