HW p. 35 1–4, 9–11, 12 b,d, 14 b

#1. a) D: $\{1900, 1920, 1940, 1960, 1980, 2000\}$ R: $\{47.3, 54.1, 62.9, 69.7, 73.7, 77.0\}$

b) D: $\{-5, -1, 0, 3\}$ R: $\{9, 15, 17, 23\}$

c) D: $\{-4, 0, 3, 5\}$ R: $\{-1, 0, 3, 5, 7\}$

2. a) D: $\{-10, -8, -6, -4, -2, 0, 2, 4, 6, 8, 10\}$ R: $\{-8, -7, -6, -5, -4, -2, 0, 4, 8\}$

b) D: $\{x \in \mathbb{R}\}$ R: $\{y \in \mathbb{R}\}$

c) D: $\{x \in \mathbb{R}\}$ R: $\{y \in \mathbb{R} \mid y \geq -8\}$

d) D: $\{x \in \mathbb{R} \mid -6 \leq x \leq 6\}$ R: $\{y \in \mathbb{R} \mid -6 \leq y \leq 6\}$

e) D: $\{x \in \mathbb{R} \mid x \leq 6\}$ R: $\{y \in \mathbb{R} \mid y \geq -2\}$

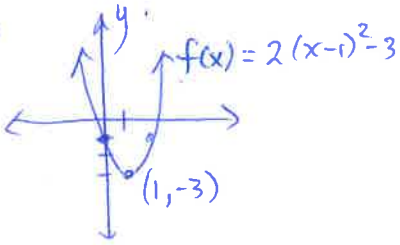
* f) D: $\{x \in \mathbb{R} \mid x \geq -10\}$ R: $\{y \in \mathbb{R} \mid y = -6, -2 \leq y < 2, y \geq 4\}$

text error — should be an equal sign here

not = b/c of hole at (4,2)

3. The functions in Q#1 are a, b and in #2 are b, c, e, f

4.

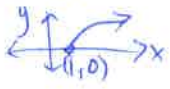


D: $\{x \in \mathbb{R}\}$
R: $\{y \in \mathbb{R} \mid y \geq -3\}$

9. a) $f(x) = -3x + 8$ D: $\{x \in \mathbb{R}\}$ R: $\{y \in \mathbb{R}\}$

b) $g(x) = -0.5(x+3)^2 + 4$ V: $(-3, 4)$ opens down D: $\{x \in \mathbb{R}\}$ R: $\{y \in \mathbb{R} \mid y \leq 4\}$

c) $h(x) = \sqrt{x-1}$ starts at $(1,0)$ D: $\{x \in \mathbb{R} \mid x \geq 1\}$ R: $\{y \in \mathbb{R} \mid y \geq 0\}$

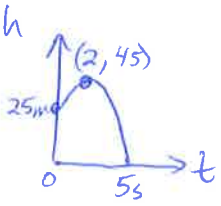


d) $p(x) = \frac{2}{3}(x-2)^2 - 5$ V: $(2, -5)$ opens up D: $\{x \in \mathbb{R}\}$ R: $\{y \in \mathbb{R} \mid y \geq -5\}$

e) $q(x) = 11 - \frac{5}{2}x$ D: $\{x \in \mathbb{R}\}$ R: $\{y \in \mathbb{R}\}$

* f) $r(x) = \sqrt{5-x}$ or $r(x) = \sqrt{-(x-5)}$ (↑ refl. in y-axis)

D: $\{x \in \mathbb{R} \mid x \leq 5\}$
R: $\{y \in \mathbb{R} \mid y \geq 0\}$

10. a) 

b) D: $\{t \in R \mid 0 \le t \le 5\}$
R: $\{h \in R \mid 0 \le h \le 45\}$

c) V: (h, k) (2, 45) sub (5, 0)
$h = a(t-2)^2 + 45$
$0 = a(5-2)^2 + 45$
$0 = 9a + 45$
$9a = -45$
$a = -5$
$\therefore h = -5(t-2)^2 + 45$

OR roots: −1, 5 sub (2, 45)
$h = a(t+1)(t-5)$
$45 = a(3)(-3)$
$-9a = 45$
$a = -5$
$\therefore h = -5(t+1)(t-5)$
or $h = -5(t^2 - 4t - 5)$
$= -5t^2 + 20t + 25$

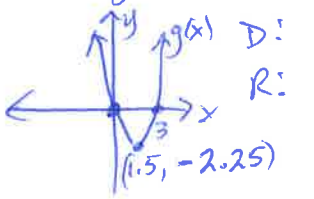
11. a) $f(x) = 4x + 1$
D: $\{x \in R\}$
R: $\{y \in R\}$

b) $f(x) = \sqrt{x-2}$
D: $\{x \in R \mid x \ge 2\}$
R: $\{y \in R \mid y \ge 0\}$

c) $f(x) = 3(x+1)^2 - 4$
D: $\{x \in R\}$
R: $\{y \in R \mid y \ge -4\}$

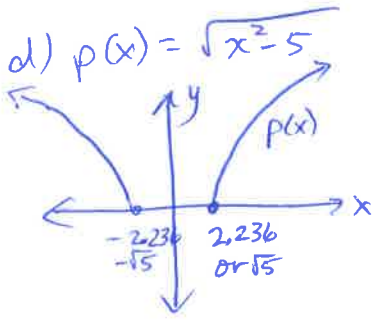
d) $f(x) = -2x^2 - 5$
D: $\{x \in R\}$
R: $\{y \in R \mid y \le -5\}$

12 b) $g(x) = x^2 - 3x$



D:
R:

d) $p(x) = \sqrt{x^2 - 5}$



D: $\{x \in R \mid x \le -\sqrt{5}, x \ge \sqrt{5}\}$
R: $\{y \in R \mid y \ge 0\}$

Note $(\sqrt{5})^2 = 5$, so $\sqrt{(\sqrt{5})^2 - 5}$
$= \sqrt{5-5}$
$= \sqrt{0}$
$= 0$
giving the pt. $(\sqrt{5}, 0)$ as the starting pt. on the right.
Similarly, $\sqrt{(-\sqrt{5})^2 - 5} = 0$
and $(-\sqrt{5}, 0)$ is the starting pt. on the left.

When $-\sqrt{5} < x < \sqrt{5}$
the p(x) values are undefined.
eg. $p(0) = \sqrt{0^2 - 5}$ $p(1) = \sqrt{1^2 - 5}$
$= \sqrt{-5}$ $= \sqrt{-4}$
$= \emptyset \leftarrow$ undef. $\rightarrow = \emptyset$

14. b) D: $\{-3, -1, 0, 2.5, 6\}$ ← subst. x values in
$f(x) = 2x^2 - 3x + 1$

R: $\{1, 6, 28, 55\}$

$f(-3) = 28$
$f(-1) = 6$
$f(0) = 1$
$f(2.5) = 6$
$f(6) = 55$