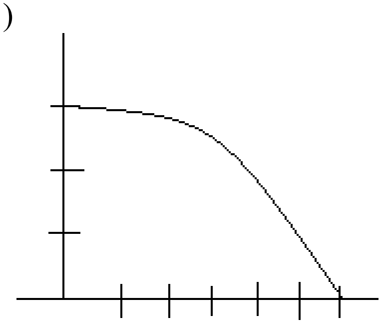
Answer Key 7

2.7: 1, 9, 13, 18, 21, 27, 29, 35, 36, 47, 51, 52, 59, 65, 71

2.8: 7, 8, 18, 22, 26, 27, 29, 46, 47, 52, 57, 69, 73, 89, 98, 99

3.1: 7, 11 22, 23, 32, 36, 43, 51, 54, 55, 63

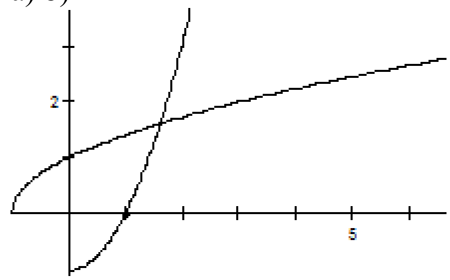
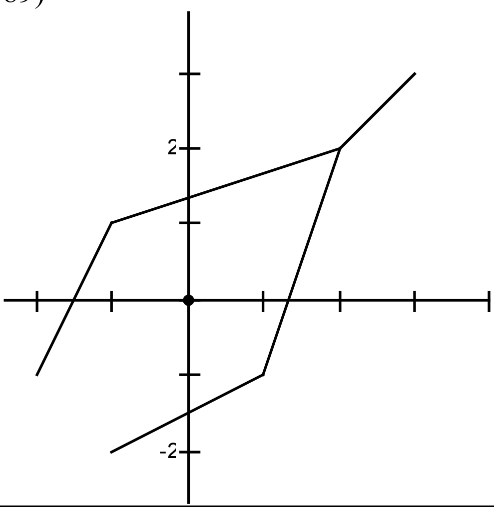
2.7

1) $(f+g)(2)=8$ $(f-g)(2)=-2$ $(fg)(2)=6$ $\left(\frac{f}{g}\right)(2)=\frac{2}{5}$	9) $(f+g)=2x^2+x$ $Domain=\mathbb{R}$ $(f+g)=x$ $Domain=\mathbb{R}$ $(fg)=x^4+x^2$ $Domain=\mathbb{R}$ $\left(\frac{f}{g}\right)=\frac{x+1}{x}$ $Domain=\{x \mid x\in\mathbb{R}\ and\ x\neq 0\}$
13) $(f+g)=\sqrt{25-x^2}+\sqrt{3+x}$ $Domain=[-3,5]$ $(f+g)=\sqrt{25-x^2}+\sqrt{3+x}$ $Domain=[-3,5]$ $(fg)=\sqrt{(25-x^2)(3+x)}$ $Domain=(-\infty,-5]\cup[-3,5]$ $\left(\frac{f}{g}\right)=\sqrt{\frac{25-x^2}{3+x}}$ $Domain=(-\infty,-5]\cup[-3,5]$	18) $\{x \mid x\in[-4,0)\cup(0,1]\}$ 21) 
27) a) $f(g(0))=f(4)=5$ b) $g(f(0))=g(-3)=-5$	29) a) $(f\circ g)(-2)=f(0)=-3$ b) $(g\circ f)(-2)=g(-7)=-45$
35) $(g\circ f)(4)=g(2)=5$	36) $(f\circ g)(0)=f(3)=0$
47) $(f\circ g)(x)=8x+1$ $(g\circ f)(x)=8x+11$ $Domain=\mathbb{R}$ $Domain=\mathbb{R}$ $(f\circ f)(x)=4x+9$ $(g\circ g)(x)=16x-1$ $Domain=\mathbb{R}$ $Domain=\mathbb{R}$	51) $(f\circ g)(x)=1/(2x+4)$ $(g\circ f)(x)=2/x+4$ $Domain=\{x\neq -1\}$ $Domain=\{x\}\neq 0$ $(f\circ f)(x)=x$ $(g\circ g)(x)=4x+12$ $Domain=\{x\neq 0\}$ $Domain=\mathbb{R}$

52) $(f \circ g)(x) = x-3$ $\quad$ $(g \circ f)(x) = \sqrt{x^2-3}$ $Domain = \{x \geq 3\}$ $\quad$ $Domain = \{x \geq \sqrt{3}\}$ $(f \circ f)(x) = x^4$ $\quad$ $(g \circ g)(x) = \sqrt{\sqrt{x-3}-3}$ $Domain = \mathbb{R}$ $\quad$ $Domain = x \geq 12$	59) $f(g(h(x))) = f(g(x-1)) =$ $f(\sqrt{x-1}) = \sqrt{x-1}-1$
65) There are many possible answers $G(x) = (f \circ g)(x)$ $f(x) = \frac{x}{x+4}$ $g(x) = x^2$	71) There are many possible answers $G(x) = (f \circ g \circ h)(x)$ $f(x) = x^9$ $g(x) = 4+x$ $h(x) = \sqrt[3]{x}$

2.8

7) Not one-to-one	8) One-to-one
18) One-to-One	22) Not one-to-one
26) $f^{-1}(18) = 5 \quad f(2) = 4$	27) $f^{-1}(x) = \frac{5-x}{2}$ $f^{-1}(3) = 1$
29) a) $f^{-1}(2) = 6$ b) $f^{-1}(5) = 2$ c) $f^{-1}(6) = 0$	46) $(f \circ g)(x) = (g \circ f)(x) =$ $\sqrt{4-\left(\sqrt{4-x^2}\right)^2} =$ $\sqrt{4-(4-x^2)} = \sqrt{x^2} = x$
47) $(f \circ g)(x) = \frac{\left(\frac{2x+2}{x-1}\right)+2}{\left(\frac{2x+2}{x-1}\right)-2} =$ $\frac{\frac{2x+2+2x-2}{x-1}}{\frac{2x+2-2x+2}{x-1}} = \frac{4x}{4} = x$	47) $(g \circ f)(x) = \frac{2\left(\frac{x+2}{x-2}\right)+2}{\frac{x+2}{x-2}-1} =$ $\frac{\frac{2x+4+2x-4}{x-2}}{\frac{x+2-x+2}{x-2}} = \frac{4x}{4} = x$

52) $f^{-1}(x)=\sqrt[3]{\frac{x-8}{3}}$	57) $f^{-1}(x)=\frac{7x+5}{x-2}$
69) $f^{-1}(x)=(x-2)^3$	73) a) b)  c) $f^{-1}(x)=x^2-1$
89)  	98) a) $g^{-1}(F)=\frac{5}{9}(F-32)$ g^{-1} represents the conversion from *F* to *C*. b) $g^{-1}(86)=30^\circ C$ So $86^\circ F=30^\circ C$
99) a) $f(x)=.9766x$ b) $f^{-1}(x)=\frac{x}{.9766}$ It represents conversion from US to Canadian dollars c) $\$12,250\times .9766=\$11963.35$	

3.1

7)

a)

Vertex at (1,3)

Y-Intercept = -1

X- Intercepts = $1 \pm \sqrt{3}/2$

b) minimum = -3

c) Domain = $\mathbb{R}$, Range = $[-3, \infty)$

11)

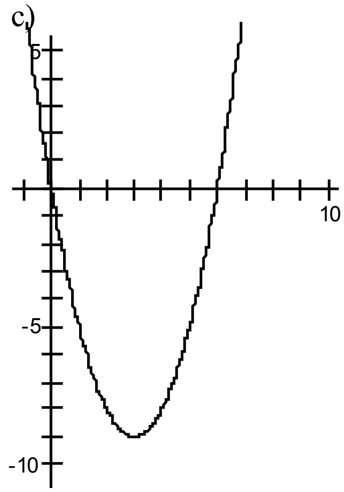
a) $f(x) = (x-3)^2 - 9$

b) Vertex at (3,-9)

Y-Intercept at 0

X-Intercepts at 0 and 6

c)



d) Domain = $\mathbb{R}$, Range = $[-9, \infty)$

22)

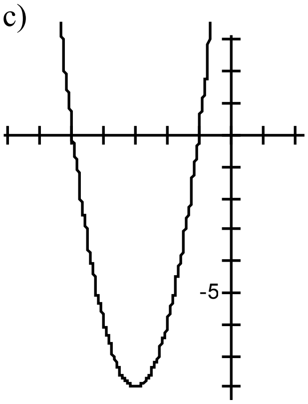
a) $f(x) = 2(x+3)^2 - 8$

b) Vertex at (-3,-8)

Y-Intercept at 10

X-Intercepts at -5 and -1

c)



d) Domain = $\mathbb{R}$, Range = $[-8, \infty)$

23)

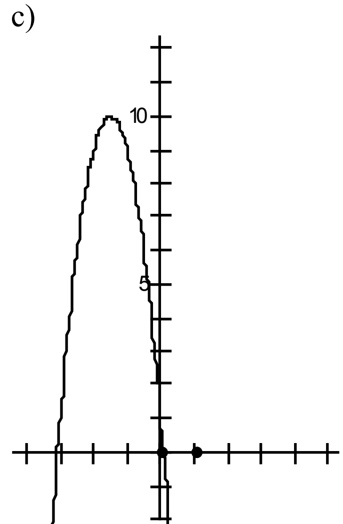
a) $f(x) = -4(x+3/2)^2 + 10$

b) Vertex at (-3/2,10)

Y-Intercept at 1

X-Intercepts at $\dfrac{3 \pm \sqrt{10}}{2}$

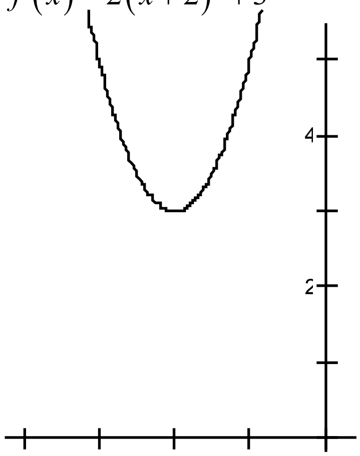
c)



d) Domain = $\mathbb{R}$, Range = $(-\infty, 10]$

32)

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



b)

c) Minimum at 3

36)

$$x = \frac{-b}{2a} = \frac{4}{-2} = -2$$

$$f(-2) = 3 + 8 - 4 = 7$$

Since $a < 0$, this is a maximum

43)

$$x = \frac{-b}{2a} = \frac{1}{-1} = -1$$

$$f(-1) = 3 + 1 - 1/2 = 7/2$$

Since $a < 0$, this is a maximum

51)

$$x = \frac{-b}{2a} = \frac{-40}{-32} = \frac{5}{4}$$

$$y = 40\left(\frac{5}{4}\right) - 16\left(\frac{5}{4}\right)^2 = 50 - 25 = 25$$

25 feet

54)

$$x = \frac{-b}{2a} = \frac{-3}{-.002} = 1500$$

$$P(1500) = -.001(1500)^2 + 3(1500) - 1800$$

$$= 450$$

$450.

55)

$$x = \frac{-b}{2a} = \frac{-2/3}{-2/90} = 30$$

30 times

63)

a)

$$2w + 2l = 2400$$

$$w + l = 1200$$

$$A(w) = wl = w(1200 - w) = 1200w - w^2$$

b)

$$\frac{-b}{2a} = \frac{-1200}{-2} = 600$$

So width = 600ft