H.W. 1

1.1) p.g. 23

28) $h(x) = \sqrt{4-x^2}$

Domain: Since inside the square root must be positive;

$$4 - x^2 \geq 0 \Rightarrow 4 \geq x^2$$

$$\sqrt{4} \geq \sqrt{x^2}$$

$\Rightarrow 2 \geq x \geq -2$ hence domain is $[-2,2]$.

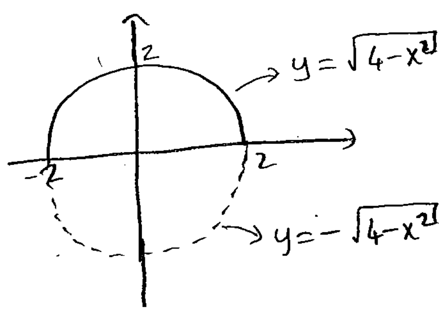
Graph: Let $y = \sqrt{4-x^2}$.

$$y^2 = (\sqrt{4-x^2})^2$$

$$y^2 = 4 - x^2$$

$\Rightarrow y^2 + x^2 = 4 \rightarrow$ Is a circle with radius 2.

$y = \sqrt{4-x^2}$ is the top half of the circle.



Range: From the graph $y \in [0,2]$ hence range is $[0,2]$.

33) $g(x) = \sqrt{x-5}$

Domain: Since inside the square root must be positive;

$$x - 5 \geq 0 \Rightarrow x \geq 5$$

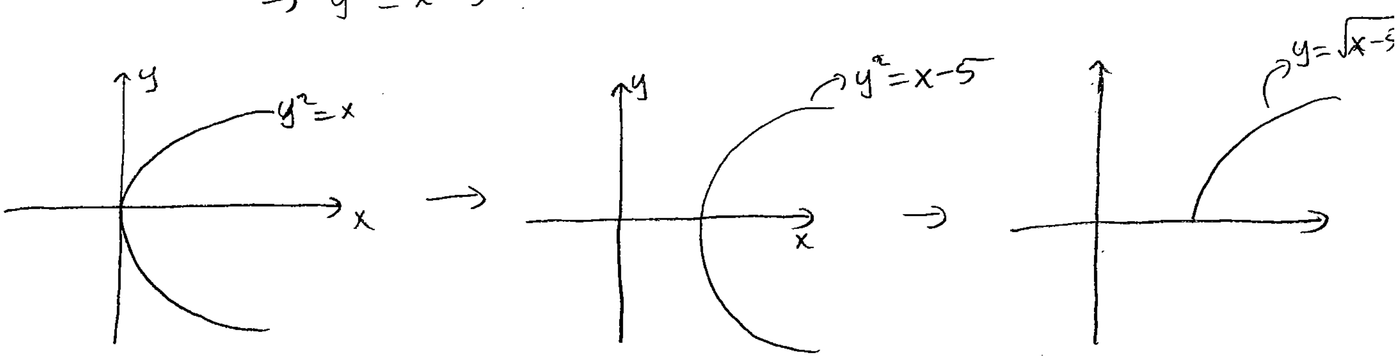
$$\Rightarrow x \in [5, \infty)$$

$$\Rightarrow \text{Domain} = [5, \infty)$$

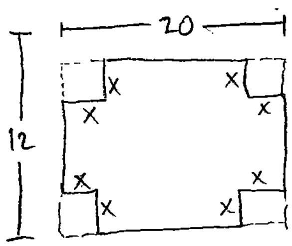
Graph: $g(x) = y = \sqrt{x-5}$

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

$$\Rightarrow y^2 = x-5$$



53)



Height $= H = x$

Length $= L = 20-2x$

Width $= W = 12-2x$

$$\Rightarrow \text{Volume} = V(x) = H.L.W = x.(20-2x).(12-2x)$$
$$= x.2(10-x).2(6-x)$$
$$= 4x(10-x).(6-x)$$

The sides must be positive hence $x > 0 \longrightarrow x > 0$

$20-2x > 0 \longrightarrow 10 > x$

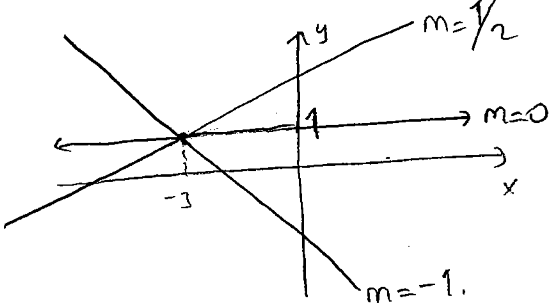
$12-2x > 0 \longrightarrow 6 > x$

Intersection of these x values give $V(x) > 0$ hence $6 > x > 0 \Rightarrow x \in (0,6)$.

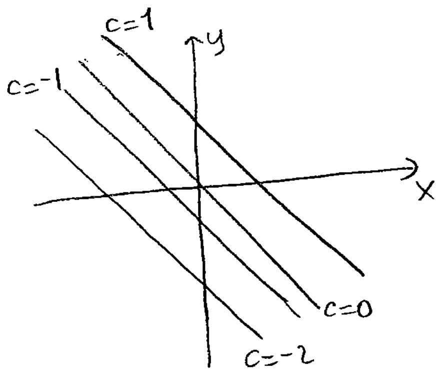
(1.2) page 36-38

6) A family of linear functions at the point (a,b) with slope m is $f(x) = b + m(x-a)$

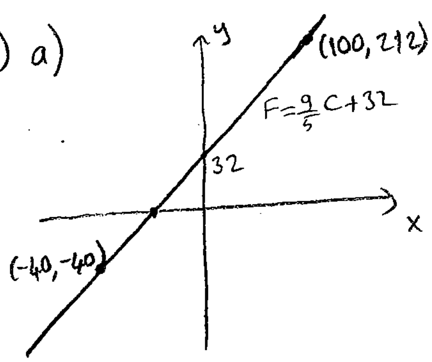
Since $f(x) = 1 + m(x+3)$, there is common point $(-3,1)$ at the family of linear functions.



7) The y intercept of $f(x) = c - x$ is c. The slope is -1.



9) a)

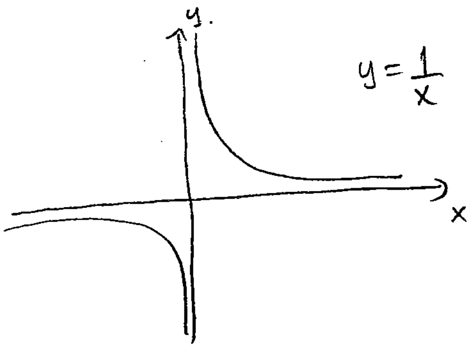


b) The slope of $\frac{9}{5}$ means that F increases $\frac{9}{5}$ degrees for each increase of $1°C$

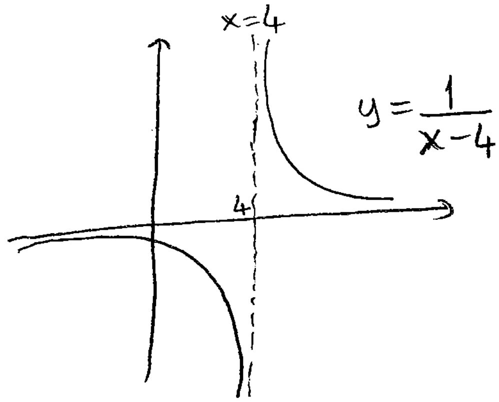
The F-intercept of 32 is the Fahrenhei temperature corresponding to a Celsius temperature of 0.

1.3 : Page 46–48

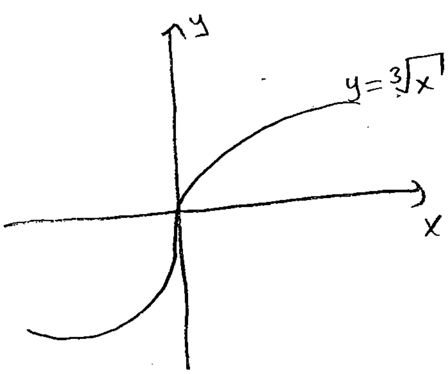
16)



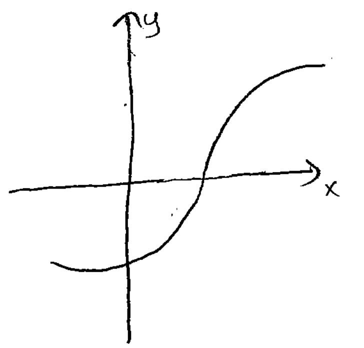
shift 4 units to the right.



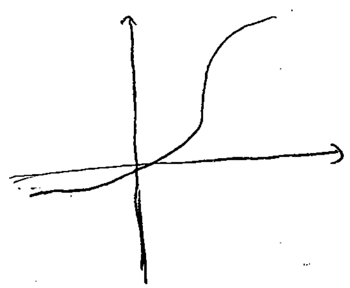
20)



shift 1 unit to the right.



Shif 1 unit upword.



32) $f(x)=\sqrt{1+x}$, $g(x)=\sqrt{1-x}$. Domain of $f(x)$ is $[-1,\infty)$ since $1+x \geq 0 \Rightarrow x \geq -$
Domain of $g(x)$ is $(-\infty,1]$.

$f(x)+g(x)=\sqrt{1+x}+\sqrt{1-x}$. Domain of $f(x)+g(x)$ is $[-1,\infty)\cap(-\infty,1]=[-1,1]$.

$f(x)-g(x)=\sqrt{1+x}-\sqrt{1-x}$. Domain of $f(x)-g(x)$ is $[-1,1]$.

$(f\cdot g)(x)=\sqrt{1+x}\cdot\sqrt{1-x}=\sqrt{(1+x)(1-x)}=\sqrt{1-x^2}$. Domain of $(f\cdot g)(x)$: $[-1,1]$

$\left(\frac{f}{g}\right)(x)=\frac{\sqrt{1+x}}{\sqrt{1-x}}=\sqrt{\frac{1+x}{1-x}}$. Domon $\frac{f}{g}=[-1,1)$ since $x=1$ is undefined.

36) $f(x)=1-x^3$, $g(x)=1/x$.

Domain of $f=\mathbb{R}$

Domain of $g=\{x \mid x\neq 0\}$

* $(f\circ g)(x)=f(g(x))=f(1/x)=1-\left(\frac{1}{x}\right)^3=1-\frac{1}{x^3}$. Domain $=\{x \mid x\neq 0\}$

* $(g\circ f)(x)=g(f(x))=g(1-x^3)=\frac{1}{1-x^3}$. Domain $=\{x \mid 1-x^3\neq 0\}=\{x \mid x\neq 1\}$

* $(f\circ f)(x)=f(f(x))=f(1-x^3)=1-(1-x^3)^3=x^9-3x^6+3x^3$. $D=\mathbb{R}$.

* $(g\circ g)(x)=g(g(x))=g(1/x)=\frac{1}{1/x}=x$. Domain $=\{x \mid x\neq 0\}$. Because 0 is not in the domain of g.

44) $f(x)=\frac{2}{x+1}$, $g(x)=\cos x$, $h(x)=\sqrt{x+3}$. $f\circ g\circ h=?$

$(f\circ g\circ h)(x)=(f\circ g)(h(x))=(f\circ g)(\sqrt{x+3})=f(g(\sqrt{x+3}))=f(\cos(\sqrt{x+3}))$

$=\frac{2}{\cos(\sqrt{x+3})+1}$

46) $F(x)=\sin(\sqrt{x})$. Let $g(x)=\sin x$ and $f(x)=\sqrt{x}$ then $(g\circ f)(x)=F(x)=\sin(\sqrt{x})$

57) a) We know that distance = rate.time. Distance is r hence

$r(t)=60.t$

b) Area $=\pi . r^2$

Since $r(t)=60t$, $(A\circ r)(t)=A(r(t))=\pi.(60t)^2$

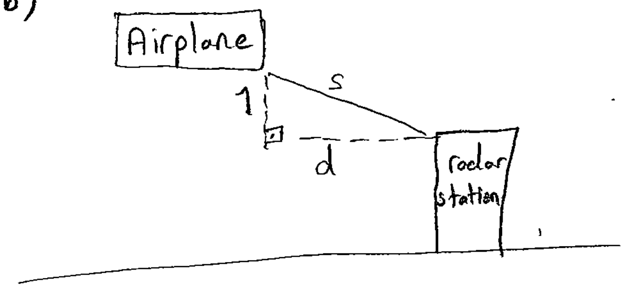
$=\pi.(3600.t^2)$

$A(t)=3600\pi t^2$

58) a) distance = rate . time.

distance = $350 . t$

b)



$s^2 = 1^2 + d^2$ (Pythagorean)

$s = \mp\sqrt{1+d^2}$

$s = \sqrt{1+d^2}$

c) $(s \circ d)(t) = s(d(t)) = s(350t) = \sqrt{1+(350t)^2}$