Section 3.2 Solutions - The Graph of a Function

6. a) yes each input has exactly one output
   b) yes - the gap is open on one end and closed on the other
   c) NO - the gap has 2 y values for the one input value
   d) yes - every input has one output.

8. Domain: $[-4,4]$ Range: $[-2, 3)$ and 4

14. Domain: $(-3,6)$ Range: $y=-1$

16. a) $F(4)=3$ b) $F(-1)=0$ c) $F(-4)$ is positive d) $F(-6)=5$
   e) $F(5)-F(-3) = 3-3=0$

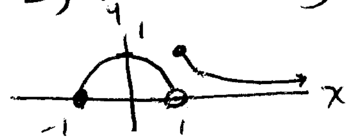
18. a) $h(a)=3$ $h(b)=0$ $h(c)=0$ $h(d)=2$ b) $h(0)$ is negative
   c) $h(x)=0$ when $x=b$ or $x=c$ d) $h(b)>h(0)$ e) $h(x)$ increasing from (c,d) f) $h(x)$ is decreasing from (a,b)

19. a) $g(-2)>f(-2)$ b) $f(0)-g(0) = 2-(-3)=5$ c) $f(1)-g(1)=2$
   $f(2)-g(2)=1$ $f(3)-g(3)=3$ so $f(2)-g(2)$ is smallest
   d) $f(1)=1$ $g(x)=1$ at $x=-2$ and $x=3$ e) range of f.

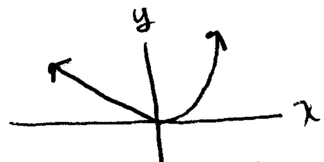
20. a) $g(x)-f(x)$ is negative on $[0,-3]$ because $g(x)$ is below $f(x)$
   $g(x)-f(x)$ is positive on $(-3,-2)$ because $g(x)>f(x)$

20. b) $g(x)-f(x)$ is positive on $(-3,-2)$ because $g(x)>f(x)$

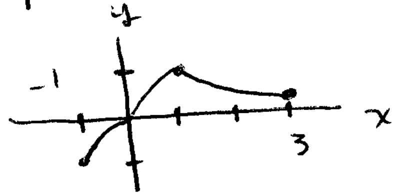
24. $B(x)=\begin{cases}\sqrt{1-x^2} & -1\le x<1\\ \frac{1}{x} & x\ge 1\end{cases}$



26. $y=\begin{cases}|x| & x\le 0\\ x^2 & x>0\end{cases}$



30. $y=\begin{cases}x^3 & -1\le x<0\\ \sqrt{x} & 0\le x<1\\ 1/x & 1\le x\le 3\end{cases}$



34. Since $g\left(\frac{2}{5}\right) = -\sqrt{1-\left(\frac{2}{5}\right)^2} = -\sqrt{\frac{21}{25}} = -\frac{1}{5}\sqrt{21}$ $P:\left(\frac{2}{5}, -\frac{\sqrt{21}}{5}\right)$

the y value of Q is the same as the y value of P and since Q goes through $y=x$ that means $Q: \left(-\frac{\sqrt{21}}{5}, -\frac{\sqrt{21}}{5}\right)$

R's x value is the same as Q's and $y=-\sqrt{1-\left(\frac{\sqrt{21}}{5}\right)^2} = -\sqrt{1-\frac{21}{25}} = -\frac{2}{5}$

$R: \left(-\frac{\sqrt{21}}{5}, -\frac{2}{5}\right)$

36. $P(-2) = \dfrac{\sqrt{2}}{1+(-2)^2} = \dfrac{\sqrt{2}}{5}$ $\quad P: \left(-2, \dfrac{\sqrt{2}}{5}\right)$

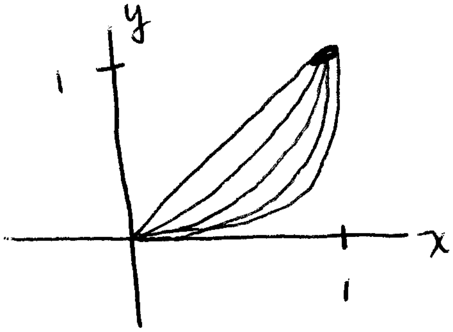
Q's y value is $\sqrt{2}/5$ and since $y = \dfrac{x}{2} \Rightarrow \dfrac{\sqrt{2}}{5} = \dfrac{x}{2} \Rightarrow x = \dfrac{2\sqrt{2}}{5}$

$Q: \left(\dfrac{2\sqrt{2}}{5}, \dfrac{\sqrt{2}}{5}\right)$

R's x-value is the same as Q's any $y = G\left(\dfrac{2\sqrt{2}}{5}\right) = \dfrac{\sqrt{2}}{1+\left(\frac{2\sqrt{2}}{5}\right)^2}$

$= \dfrac{\sqrt{2}}{1+\frac{8}{25}} = \dfrac{\sqrt{2}}{\frac{33}{25}} = \dfrac{25\sqrt{2}}{33}$ $\quad R: \left(\dfrac{2\sqrt{2}}{5}, \dfrac{25\sqrt{2}}{33}\right)$

37.



As the exponent gets larger the curve gets closer to the horizontal axis. $y = x^{100}$ would be very flat at first and then quickly rises to $y=1$