1 Section 1.1

3) The graph of a function $f$ is given.
   
a) State the value of $f(1)$.
   b) Estimate the value of $f(-1)$.
   c) For what values of $x$ is $f(x) = 1$?
   d) Estimate the value of $x$ such that $f(x) = 0$.
   e) State the domain and range of $f$.
   f) On what interval is $f$ increasing?
11) The graph shown gives the weight of a certain person as a function of age. Describe in words how this person’s weight varies over time. What do you think happened when this person was 30 years old?

37) Find the domain of the function \( F(p) = \sqrt{2 - \sqrt{p}} \).

45) Find the domain and sketch the graph of the function \( G(x) = \frac{3x + |x|}{x} \).

53) Find an expression for the function whose graph is the bottom half of the parabola \( x + (y - 1)^2 = 0 \).

59) Express the area of an equilateral triangle as a function of the length of a side. What is the domain of this function?
63) A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 12 in. by 20 in. by cutting up equal squares of side $x$ at each corner and then folding up the sides as in the figure. Express the volume $V$ of the box as a function of $x$.

![A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 12 in. by 20 in. by cutting up equal squares of side $x$ at each corner and then folding up the sides as in the figure. Express the volume $V$ of the box as a function of $x$.]

65) In a certain state the maximum speed permitted on freeways is 65 mi/h and the minimum speed is 40 mi/h. The fine for violating these limits is $15$ for every mile per hour above the maximum speed or below the minimum speed. Express the amount of the fine $F$ as a function of the driving speed and graph $F(x)$ for $0 \leq x \leq 100$.

A function $f$ is even if $f(x) = f(-x)$ for all real numbers $x$. A function $f$ is odd if $f(-x) = -f(x)$ for all real numbers $x$. Visually, this means that even functions are symmetric across the y-axis and that odd functions are symmetric with respect to $180^{\circ}$ rotation around the origin.

76) Determine whether the function $f(x) = x|x|$ is even, odd, or neither. If you have a graphing calculator, use it to check your answer visually.

80) If $f$ and $g$ are both even functions, is the product $fg$ even? If $f$ and $g$ are odd functions, is $fg$ odd? What if $f$ is even and $g$ is odd? Justify your answers.