Section 1.1

2. Consider the set $P$ of all people living in your city at present. Determine which rules from the ones below define functions.
   
   a. For each person $x$, let $f(x)$ be the father of person $x$.
   b. For each person $x$, let $g(x)$ be the son of person $x$.
   c. For each person $x$, let $h(x)$ be the height of person $x$.
   d. For each person $x$, let $w(x)$ be the weight of person $x$.

5. Let $B$ denote the collection of all books in your library and for each book $x$ let $f(x)$ be the author of the book $x$. Does this rule define a function? If not, then what modification can you make to the rule in order to make it a function?

Section 1.3

3. A television manufacturer determines that in order to sell $x$ units of a new television, the price per television set must be $p = 960 - x$. The total cost of producing $x$ television sets is given by the cost function $C(x) = 4000 + 30x$. How many television sets must the manufacturer produce and sell in order to maximize the profit? [Answer: 465.]

6. An appliance store sells 810 television sets per year. It costs $12 to store a set for a year. To reorder new television sets from the manufacturer, there is a fixed cost of $60 plus $10 for each set. How many times per year should the store reorder, and in what lot size in order to minimize inventory costs? [Answer: 9 times a year with a lot size of 90 television sets. Hint: The average number of sets in the inventory is half the number ordered each time. So, if you order 30 TV’s at a time, the average number of TV’s in the inventory is 15. If you order $x$ TV’s at a time, the average number of TV’s in the inventory is $x/2$.]

extra Find the maximum and minimum of the following functions on the intervals indicated.

(a) $f(x) = x^2 - 2x + 2$ for $0 \leq x \leq 3$
(b) $g(x) = -x^2 + 2x + 4$ for $0 \leq x \leq 3$

Section 1.6

3. You are a risk-neutral individual whose net worth is $10,000 and you are thinking of opening a Donut Franchise. To open the franchise you must invest $5,000. If you buy the franchise, the probability is $1/3$ that you will make $500,000, $1/3$ that you will break even, and $1/3$ that you will lose the entire investment. What would be your decision? In general, at what probabilities would you change your decision? [Hint for 3 & 4: The wording is somewhat ambiguous. However, take the problem to mean that in the three cases the net worth of the individual at the end is $510,000, $10,000, and $5,000 respectively.]

4. In Exercise 4, what would your answer be in $u(w) = \ln(w)$?

6. In Example 1.21, we discuss how much insurance an individual would buy. Now suppose an individual, if he buys insurance, will have to buy coverage that is 80% of the value of the house. What premium $x$ is the individual willing to pay for a house that is worth $100,000 if $u(w) = \sqrt{w}$?