Exercises

6.5.1 A random variable X has the density function

$$f(x) = \begin{cases} 1/(2\sqrt{x}) & \text{for } 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

a. Graph the density function $f(x)$ over the interval $[0, 1]$.
b. Find the cumulative distribution function, $F(x)$ and graph it over the interval $[0, 1]$.
c. Find the inverse cumulative distribution function, $F^{-1}(y)$ and use it to generate 100 values of X.

6.5.2 Repeat Exercise 6.5.1 with the density function

$$f(x) = \begin{cases} x^3/4 & \text{for } 0 < x < 2 \\ 0 & \text{elsewhere} \end{cases}$$

and graph over the interval $[0, 2]$.

6.5.3 Repeat Exercise 6.5.1 with the density function

$$f(x) = \begin{cases} 2(1-x) & \text{for } 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$

(**Hint**: Use the quadratic formula to solve for x in terms of y.)

6.5.4 Create a graph of the exponential density function over the interval $0 \le x \le 10$. Use a scroll bar to vary the value of λ. Describe what happens to the shape of the graph as λ changes.

6.5.5 Create a graph of the normal density function over the interval $\mu - 3\sigma \le x \le \mu + 3\sigma$. Use scroll bars to vary the values of μ and λ. Describe what happens to the shape of the graph as μ and λ change.

6.6 Approximating Density Functions

In this section we will illustrate how to graphically show that a particular density fits a given set of data. We will start by showing that the 1000 values of the random variable we generated in the worksheet **Exponential** are indeed described by an exponential distribution.

When analyzing a large set of numerical data (the 1,000 values we generated in this case), often the first step is to generate a **relative frequency histogram** such as that shown in