STAT 341 Homework 7

p. 89: 34, 36, 56

1. Let T be the length of time you must wait in a line, in minutes. The distribution function of T is

$$F(t) = \begin{cases} 0, & \text{for } t < 0, \\ \frac{t^2}{6}, & \text{for } 0 \le t \le 2, \\ 1 - \frac{(t-3)^2}{3}, & \text{for } 2 < t \le 3, \\ 1, & \text{for } 3 < t. \end{cases} \tag{1}$$

a. Find the density function and sketch its shape.

b. Evaluate the probability that you must wait more than 1 minute.

2. Let U be a random variable with density function

$$f(u) = \begin{cases} \frac{1}{\sqrt{u}}, & \text{for } 0 < u < a \\ 0 & \text{otherwise.} \end{cases} \tag{2}$$

a. Find the value of a. Hint: $1 = \int_0^a f(u)\mathrm{d}u$.

b. What are the values for u such that $f(u) > 1$?

3. A random variable X has density function

$$f(x) = \begin{cases} 2e^{-2x}, & \text{for } 0 < x \\ 0, & \text{otherwise.} \end{cases} \tag{3}$$

a. Find the distribution function of X.

b. Determine the median of X.

c. Determine the pth percentile, for $0 < p$.

4. The number of errors Z that occur in a test has distribution function

$$F(z) = \begin{cases} 0, & \text{for } z < 0, \\ .6, & \text{for } 0 \le z < 1, \\ .9, & \text{for } 1 \le z < 2, \\ 1, & \text{for } 2 \le z. \end{cases} \tag{4}$$

a. Is Z discrete or continuous?

b. Find the probability function of Z.