Assignment 8

Reading Assignment:

1. Chapter 9: Functions and Derived Distributions.

Problems:

1. The number of years a radio functions is exponentially distributed with parameter $\lambda = \frac{1}{8}$. If Jones buys a used radio, what is the probability that it will be working after an additional 8 years.

2. If Y is uniformly distributed over $(0, 5)$, what is the probability that the roots of the equation $4x^2 + 4xY + Y + 2 = 0$ are both real?

3. Alvin throws darts at a circular target of radius r and is equally likely to hit any point in the target. Let X be the distance of Alvin's hit from the center.

   (a) Find the PDF, the mean, and the variance of X.

   (b) The target has an inner circle of radius t. If $X \leq t$, Alvin gets a score of $S = 1/X$. Otherwise his score is $S = 0$. Find the CDF of S. Is S a continuous random variable?

4. If X is a random variable that is uniformly distributed between -1 and 1, find the PDF of $Y = \sqrt{|X|}$ and the PDF of $Z = -\ln|X|$. (Hint: Compute the CDF first.)

5. Find the PDF of e^X in terms of the PDF of X. Specialize the answer to the case where X is uniformly distributed between 0 and 1.

6. Find the PDF of $|X|^{1/3}$ and $|X|^{1/4}$ in terms of the PDF of X.