# Assignment 9

**Reading Assignment:**

1. Chapter 9: Functions and Derived Distributions.

**Problems:**

1. 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?

2. 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.)

3. 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.

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

5. If $X$ is an exponential random variable with parameter $\lambda = 1$, compute the probability density function of random variable $Y$ defined by $Y = \log X$.

6. If $X$ is uniformly distributed over $(0, 1)$, find the density function of $Y = e^X$.