STA 673 Practice Problems #1

1. Is the probability function P a continuous function? Please explain.

2. Consider a sample space of an experiment which contains four elements given by $S = \{x, y, z, w\}$. Is $\mathcal{B} = \{\emptyset, S, \{x, y\}, \{z\}, \{w\}\}$ a sigma-algebra? Please explain.

3. Two marksmen fire rifles independently and simultaneously at a target. Suppose the probability the first marksman's bullet hits the center of the target is 0.2 and the probability the second marksman's bullet hits the center of the target is 0.5. Given that one and only one bullet hits the center of the target, what is the probability it was the second marksman's bullet?

4. Prove Theorem 1.6.5 for the discrete case.

5. **a.** Verify that $f_X(x) = -ln(x)I_{(0,1)}(x)$ is the pdf of a random variable X.
b. Find and plot the cdf of X.
c. What is the pdf of $Y = g(X) = e^{-X}$?

6. Suppose y is a randomly generated value of $Y \sim Uniform(0, 1)$. If $X \sim F_X$, how would one generate a random value of X? Please explain.