Time: 20 mins

Name: Std. Number:

Prerequisite Quiz

Questions

1. Suppose that m and n are positive integers. What is the probability that a randomly chosen positive integer less than mn is not divisible by either m or n?(10 points)

2. A simple example of a random variable is the *indicator* of an event A, which is denoted by I_A:

$$I_A(\omega) = \begin{cases} 1, & if \ \omega \in A \\ 0, & Otherwise. \end{cases}$$

   (a) Prove that two events A and B are independent if and only if the associated indicator random variables, I_A and I_B are independent.(6 points)

   (b) If $X = I_A$, find $E[X]$. (4 points)

3. Let X be a continuous random variable with the following PDF

$$F_X(x) = \begin{cases} ce^{-x}, & x > 0 \\ 0, & Otherwise. \end{cases}$$

   where c is a positive constant.

   (a) Find c

   (b) Find the CDF of X, $F_X(x)$

   (c) Find $P(1 < X < 3)$