

Probability and Random Processes

Course No: 14:332:321 (Fall 2000)

Exam 1

Maximum Marks : 30

Total Time : 1hour & 10minutes

Instructions : *Answer all questions. The points for each question are listed below in parentheses.*

1. Read the following statements and state if they are “true” or “false” (5)
 - (a) Given 3 distinguishable objects, there are 6 ways to choose with replacement a sample of 2 objects
 - (b) An event space is collectively exhaustive but not mutually exclusive
 - (c) If two events A and B are independent, then A and B^c are not.
 - (d) The Cumulative Distribution Function (CDF) of a discrete random variable is right continuous at its jump points.
 - (e) The probability mass function (PMF) of a discrete random variable is a non-decreasing function.
2. At the end of regulation time in a basketball game, the L.A. Lakers are trailing by one point and Shaquille “Shaq” O’Neal (a pretty lousy free throw shooter) goes to the line for two free throws. If he makes exactly one free throw, the game goes into overtime. The probability that the first free throw is good is $1/3$. Further, if the first attempt is good, Shaq relaxes and the second attempt is good with probability $3/4$. However, if Shaq misses the first attempt, the added pressure reduces the success probability on the second attempt to $1/4$. (14)
 - (a) What is the probability that Shaq sends the game into overtime ?
 - (b) Given that the game goes into overtime, what is the probability that Shaq made the first shot ?
3. You and I decide to make a wager for a dollar. We toss an unbiased coin repeatedly until one of the two things happens: (10)
 - (a) Two tails (TT) appear in a row and we stop and you win a dollar.
 - (b) A head appears immediately followed by a tail (HT) and we stop and I win a dollar

If we repeat this wager an infinite number of times, who do you think is going to win more money ? In fact, what is the probability of my winning ?

4. How old do you think is the instructor for this course ? (1)

Hint: The answer might make all the difference between a good and bad grade ! :)

Good luck!