

American University of Beirut

STAT 230

Introduction to Probability and Random Variables

Fall 2007-2008

quiz # 1

Name:

ID #:

Exercise 1 a. (4 points) A total of 7 different gifts are to be distributed among 10 children. How many distinct results are possible if no child is to receive more than one gift?

b. (4 points) A pizza comes always with cheese, but you may add to it any number of toppings. There are 4 toppings available (mushrooms, green pepper, pepperoni, tomatoes). How many different pizza orders are possible? (it is possible not to add any of the toppings).

c. (6 points) Two fair dice are rolled. Find the conditional probability that at least one lands on 6 given that the dice land on different numbers.

d. (6 points) There are n pairs of socks, 3 of which are red, in a drawer. What is the value of n if when 2 of the socks are chosen randomly, the probability that they are both red is $\frac{1}{2}$?

Exercise 2 An urn contains 4 white balls and 4 black balls. We randomly choose 4 balls. If 2 of the are white and 2 of them are black, we stop. If not, we replace the balls in the urn and again randomly select 4 balls. This continues until exactly 2 white balls are selected.

a. (15 points) Find the probability of exactly 5 selections.

b. (5 points) Find the expected number of selections made.

Exercise 3 (15 points) At a party n men take off their hats. The hats are then mixed up, and each man randomly selects one. We say that a match occurs if a man selects his own hat. What is the probability of no matches?

Exercise 4 (15 points) Let A, B and C three independent events with probabilities $1/2, 1/6, 1/4$. Find $P((\bar{A} \cap \bar{B}) \cup C)$.

Exercise 5 (15 points) An urn contains b black balls and r red balls. One of the balls is drawn at random, but when it is put back in the urn, c additional balls of the same color are put in with it. A ball is then selected form the urn, what's the probability that the first ball was black given that the second ball drawn was red?

Exercise 6 (15 points) A couple has decided to keep having babies till the **second** girl is born. Assume that the probability of having a girl is the same as having a boy equals $1/2$. Let X be the number of trials needed. Find the pdf of X . Find $\mathbf{E}(\mathbf{X})$.