

Midterm Practice1– probability – Schneider

1. Write down the number of possibilities in the following problems (you can leave in symbolic form with numbers in correct places)
 - a. The number of different letter arrangements from **queue**
 - b. You have nine elements in a sample space. How many different five element sets (events) are there.
 - c. There are 9 events in a sample space (A thru I). How many different sets of events include the event A.
 - d. You have fifteen people in a baking contest. How many ways can there be four winners where there is a first, second, third and fourth place winner?
 - e. Consider $(x+y)^{10}$. What is the coefficient of x^5y^5 .
 - f. How many outcomes of 10 flips of a coin have 5 heads?
2. Note that (like the book) when I write capital letters next to each other I am indicating intersection. A,B,C and D are sets.
 - a. Show that the sets AD^cBC and $ADBC$ are disjoint where D^c is $\sim D$.
 - b. Let A, B, C be events in a sample space. Prove that the whole sample space is $ABC \cup ABC^c \cup AB^cC \cup AB^cC^c \cup A^cBC \cup A^cBC^c \cup A^cB^cC \cup A^cB^cC^c$. The above is all the three intersections of the events or their complements.
3. Urn A contains 2 red and 8 black balls. Urn B contains 8 red and 2 black balls. If a ball is randomly and independently chosen from each urn what is the probability that they will be different colors.
4. A total of 28 percent of American males smoke cigarettes, 7 percent smoke cigars and 5 percent smoke cigars and cigarettes.
 - a. What percentage of males smoke neither cigars nor cigarettes.
 - b. What percentage smokes cigarettes but not cigars?
5. Maria will take two books with her on a trip. Suppose that the probability that she will like book 1 is .6, the probability that she will like book 2 is .5 and the probability that she will like both books is .4. find the conditional probability that she will like book 2 given that she did not like book 1.
6. Prove our theorem (from definitions of conditional probability) that if $P(AB) = P(A)P(B)$ then $P(A|B) = P(A|B^c)$ where $P(B)$ and $P(B^c)$ are not 0.
7. Suppose $P(H_2|H_1) = .7$ and $P(T_2|T_1) = .5$ where we are either in an H situation or a T situation (heads or tails) and the subscripts refer to the first or second trial. We also know that $P(H_1) = .5 = P(T_1)$
 - a. Let T_2 be the event of a tail on the second trial. What is $P(T_2)$.
 - b. With similar notation what is $P(T_1|T_2)$