Probability and Statistics

Test 1

Feb 6, 2009

Name:…….

18+4+ 6+6+6+12+4+12+8+12+ 12=100

1. Let $P(A) = 0.46$, $P(B) = 0.63$, and $P(A \cap B) = 0.29$. Find the following:
   a. $P(A \cup B)$

   b. $P(A' \cup B')$

   c. $P(A \cap B')$

   d. $P(A' \cup B)$

   e. $P(B \mid A)$

   f. $P(A \cap B' \mid A \cup B)$.

2. A travel brochure lists 10 museums in the city of London. In how many ways can a tourist visit four museums if the order does not matter?

3. Let $P(B) = 0.50$ and $P(A \cap B) = 0.20$. Assuming A and B are independent, find $P(A \cup B)$.

4. Let $P(A) = 0.45$, $P(B) = 0.25$, and A and B are mutually exclusive. Find $P(A' \cap B')$.

5. Prove the followings: $P(A') = 1 - P(A)$

6. In a population, 10% of the adults are smokers. Among the non-smokers, p percent has lung cancer and among smokers the percentage is 10 times as high ($10p$). If a randomly selected adult has cancer, what is the probability he/she is a smoker?

7. How many different varieties if pizza can be made if you have the following choices: 3 different sizes, 3 different crusts, and 4 toppings from which you can select from 0 to 4 (cheese is automatic)?

8. Assume the experiment of tossing a fair coin until you get the heads.
    a. Write down the sample space S using H and T. Sample space is all the possible outcomes of this experiment.
    b. Show that $P(S)=1$.

9. Three married couples have purchased theater tickets and are seated in a row consisting of 6 seats. If they take their seats in a completely random fashion, what is the probability Mr. X and Mrs. X will sit next to each other? Hint: Think about number of ways Mr. X and Mrs. X can sit together. For each way in how many different ways can the others sit?

10. An urn contains 4 red and 6 blue balls. A second urn contains 16 red balls and unknown number of blue balls. A single ball is drawn randomly from each urn. If the probability of both balls are of same color is 0.44, find the number of blue balls in the second urn.

11. Among the students in probability and statistics class, 10% has a prior GPA of 3.5 -4.0, 30% has a prior GPA of 3.0-3.5, and the rest has a GPA less than 3%. Among the top 10% incoming students, only 90% makes a grade of A. Among the next 30%, only 40% makes an A. Among the rest only 5% makes an A in this class. If a randomly select student received an A, what is the probability that he/she has an incoming GPA of 3.0-3.5?