

Monday, October 20, 2008

Math 180a Midterm 1

Instructions No calculators, books, or cell phones may be used. You may have one piece of paper, 8 1/2 x 11, written on one side only. Answer all questions. Explain what you are doing and what your notation means. You may leave your answer in the form of a numerical expression. Write clearly!

1. (20 pts.) There are 10 new teachers to be assigned randomly to 5 schools, with 2 at each school.

(a) How many possible assignments are there?

(b) If 2 of the teachers are brothers, what is the probability that they will be assigned to the same school?

1. (20 pts.) At a political discussion group there are 50 Democrats and 35 Republicans. A reporter chooses 3 at random to interview. What is the probability that no Republican will be interviewed?

3.(20 pts.) A parallel system of 5 components functions whenever at least one of its components works. The components, labeled, c_1, c_2, c_3, c_4, c_5 , work independently with probabilities given by p_1, p_2, p_3, p_4, p_5 , respectively, i.e.

$$P\{c_i \text{ works}\} = p_i, \quad i = 1, 2, \dots, 5.$$

Find the conditional probability that component 2 works given that the system is functioning.

4. (20 pts.) A popular book was bought by men and women in a ratio of 1 to n . Of those women who bought the book, 55% finished reading it, while only 40% of the male purchasers finished the book. What is the probability that a purchaser of the book finished reading it? (The answer should be in terms of the unknown n .)

5.(20 pts.) A box contains 10 biased coins, of which 3 are red, 3 are white, and 4 are blue. The red coin comes up heads 20% of the time, the white coin 40% of the time, and the blue coin 70% of the time. An experimenter picks a coin at random and tosses it twice. He observes that it came up heads both times, but does not say what color it was. What is the probability that he chose the white coin?