MA222

Spring 2008

Review Problems for First Midterm

1. We want to use 0, 1, 2, 3, 4 and 5 to make 4 digit numbers. We can use each digit at most once when constructing the numbers. How many 4-digit numbers can we make? (**note:** if the number starts with zero is only a 3-digit number)

2. A deck of 52 cards is well shuffled then 2 cards are dealt. What is the probability that the 2 cards are both aces? What is the probability that both cards dealt are spades?

3. Bowl A has 2 white eggs and 4 brown eggs and bowl B has 3 white and 2 brown eggs. We randomly choose one bowl and from it we randomly choose 2 eggs. When we got 1 white egg and 1 brown egg, what is the probability that they come from bowl A?

4. We have 7 white balls and 13 black ones in a ceramic box. We then choose 3 balls at random. Find probability of getting 3 white balls. Exactly 2 white ones. At most one black. No blacks. Exactly one black.

5. The height of newborn babies at Home Hospital is known to have mean 10 inches and standard deviation 1 inch.

   (a) Find an interval which contain at least 95% of heights of new born babies

   (b) How often the height of a newborn baby is bigger than 13 inches or less than 7 inches?

6. My cousin George wants to have a son, he is so desperate that he will try no matter how long to have one. He will continue to make kids until the first boy is born. Assume that each newborn baby has equal chance of being a boy or a girl. Find the probability that George will end up having 2 kids. Will end up with 4 kids. 7 kids.

7. When Billy mows his grandfather's lawn, the amount of money he gets is a random variable determined as follows. First Billy flips a fair coin. If he gets heads, he rolls a fair dice once and gets X dollars, where X is the number showing on the die. If he gets tails on the coin flip, he rolls two fair dice and gets T dollars, where T is the total of the two numbers on the two dice.

   (a) What is the probability that Billy gets paid exactly three dollars?

   (b) You hear that Billy is disappointed because he was only paid three dollars the last time he mowed his grandfather's lawn. Given this information, what is the probability that Billy got heads on the coin flip?

8. Roll 2 dies. What is the probability that the sum of points on the 2 dies is 7?
   Now suppose you play a game of some sort where you win if you get 7 and loose otherwise. If you play 10 such games what is the probability of winning exactly one game? Exactly 2? At least 2.

9. Suppose you have a regular deck of cards (52 in total). Now shuffle the deck very well and deal 4 cards from it. Find the probability that all 4 are aces. Find probability that all 4 are spades. You end up with exactly 2 kings. With 1 club and 3 diamonds.

(Exam Problems) You walk into your class the first day of classes, and you notice that there are 30 men and 20 women in the class already. Let's suppose you decide to choose two people from the class to be your study partners.

1. How many possible choices do you have?

A. $\binom{49}{2}$

B. 1176

C.1220.5

D. 1225

2. If you choose your study partners at random, and given that at least one of your study partners is a woman, what is the probability of the event E that both of them will be women?

A. 0.3167

B. 1.9%

C. 0.2405

D. 0.1901

3. If the instructor chooses three people at random from the entire class (yourself plus the other 50 students) and assigns three different tasks to them, in how many ways can these tasks be assigned?

A. $\binom{51}{3}$

B. $\binom{50}{2}$

C. 124950

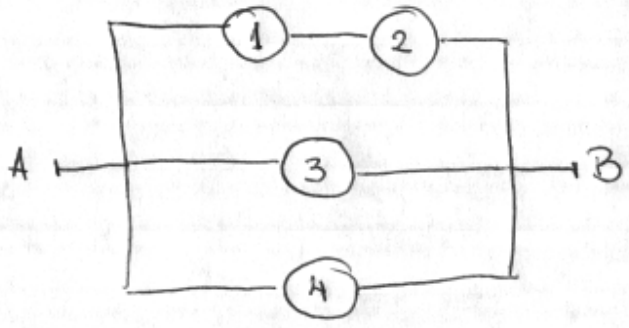
D. 117600

4. The renowned surgeon, Dr. Cut'u Good, specializes in appendectomies and face-lifts. Of the patients he sees, 20% have appendicitis, while the rest have bags under their eyes. Of those with appendicitis, 95% undergo surgery, while only 65% of those with baggy eyes go under his knife.

a) If a patient visits him, what is the probability he will undergo surgery (regardless of the complaint)?

b) If on the day you go to see him, he has just finished an operation, what is the probability that the patient had his appendix removed?

5. When turned on, each of the four switches in the accompanying diagram, mutually independent works properly with probability 0.8. If a switch is working properly, current can flow through it when it is turned on. Let Y be the number of closed paths from A to B, when all four switches are turned on.



Find probability that current flows from A to B. Find the probability that Y equals 1.