

MATH 264 Homework 2

DUE TO:

November 30, BEFORE CLASS, for Section 1,
December 1, BEFORE CLASS, for Sections 2,3.

IMPORTANT

- This homework consists of 7 questions and only 3 of them will be evaluated. The questions to be evaluated will be selected randomly, and will be evaluated from each paper! So, you won't get any credit if you can't solve the randomly selected questions although you solve the remaining 4 questions.
 - Please read the question(s) carefully!
 - Show all your work. Correct answers without sufficient explanation WILL NOT get full (or partial) credit.
 - The deadline is strict! Late papers will not be accepted in ANY situation.
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QUESTIONS

- 1) Suppose that we have three cards identical in form except that both sides of the first card are colored red, both sides of the second card are colored black, and one side of the third card is colored red and the other side black. The three cards are mixed up in a hat, and one card is randomly selected and put down on the ground. If the upper side of the chosen card is colored red, what is the probability that the other side is colored black?
- 2) It has been claimed that in 60% of all solar heat installations the utility bill is reduced by at least one-third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in
 - (a) four of five installations;
 - (b) at least four of five installations?
- 3) Two balls are chosen randomly from an urn containing 8 white, 4 black, and 2 orange balls. Suppose that we win \$ 2 for each black ball selected and we lose \$ 1 for each white ball selected. Let X denote our winnings.
 - (a) Find the probability distribution of X .
 - (b) Find the expected value of X .
- 4) Let an urn contains 7 balls, numbered from 1 to 7. Two balls are selected randomly from the urn. Let X be the difference of the numbers (that is, the largest number minus the smallest number) of the selected balls. Find the probability distribution of X and its mean and standard deviation if
 - (a) the balls are selected from the urn with replacement.
 - (b) the balls are selected from the urn without replacement.
- 5) A collection of 15 gold coins contains 4 counterfeits. If 2 of them are randomly selected to be sold at auction, find the probabilities that
 - (a) neither of them is a counterfeit;
 - (b) only one of them is a counterfeit;
 - (c) both coins are counterfeits.
- 6) The number of customers who visit a car dealer's showroom on a Saturday morning is a random variable with $\mu = 18$ and $\sigma = 2.5$. With what probability can we assert that there will be between 8 and 28 customers?
- 7) A soft drink machine can be regulated so that it charges an average of 195 ml per cup. Assume that the amount of fill is normally distributed with standard deviation of 5 ml. Find the probability that 200 ml cup will overflow if you use this machine to fill a soft drink.