

University of California, Los Angeles
Department of Statistics

Statistics 13

Instructor: Nicolas Christou

Exam 2 - practice problems

Problem 1

The probability of winning a particular game is $p = \frac{2}{5}$. A player plays 100 such games and each game has payoff \$5 (if the player wins) or -\$1.

- a. Write an expression of the exact probability that the player will make more than \$80 in these 100 games.
- b. Approximate the probability of part (a).
- c. What is the approximate probability that the player will win more than 25 games?

Problem 2

The amount of water consumed per day at the Math Sciences Building at UCLA follows the normal distribution with mean $\mu = 25$ cubic meters and a standard deviation of $\sigma = 3$ cubic meters. Assume that the water consumption is independent from day to day.

- a. What is the probability that in one week (5 working days) the water consumption will exceed 110 cubic meters?
- b. Please draw the distribution of the total water consumption for one month (30 days), and the distribution of the average water consumption for one month. Make sure you place some important numbers on the graphs.
- c. What is the probability that the first day that the water consumption will exceed 28 cubic meters will occur after 10 days from today?
- d. What is the approximate probability that during the winter quarter (70 days) the water consumption will exceed 28 cubic meters on at least 16 days?

Problem 3

Answer the following questions:

- a. There are 12 people on a college debate team, 5 female and 7 male students. If the team coach selects three at random to attend an event, find the probability that the selection will be mixed gender. That is, find the probability that the selected group of three will have at least one male and at least one female student.
- b. Two standard card decks are shuffled together (104 cards), and 4 cards are selected without replacement. Write down the expression that computes the probability of 3 clubs.
- c. Approximate the probability of part (b).

Problem 4

The chocolate chip cookies that are produced at a certain bakery have weights which are normally distributed with mean weight 18 grams and with standard deviation 3 grams.

- a. The cookies, however, are sold by count, not by weight. This bakery wants to improve their image and they decide to set aside the lightest 20% of the cookies to be packaged and sold separately. What cookie weight will divide the lightest 20% from the heaviest 80%?
- b. Suppose 4 cookies will be randomly selected. Give an interval that covers the middle 80% of the distribution of the sample mean.
- c. What is the probability that a box with 36 such cookies will weigh more than 675 grams?

Problem 5

Answer the following questions:

- a. The height X of a certain type of trees at a park follows the normal distribution with mean 20 feet and standard deviation 2.5 feet. The annual cost Y (in dollars) for maintaining a tree of this type is a function of its height and it is equal to $Y = 5X + 2$. Find the probability that the cost for a randomly selected tree from this park will be between \$96 and \$115.
- b. Ten trees (from question (a)) are randomly selected. Find the probability that two of them will have height more than 23 feet.
- c. Find the 5_{th} percentile of the distribution of the total cost of 10 such trees from part (a).