

Show all work neatly and systematically for full credit. Total points: 103

Find the indicated probability by using the special addition rule.

1) (6) A card is drawn from a well-shuffled deck of 52 cards.

a. What is the probability of drawing an ace **or** a 7?

b. What is the probability of drawing a spade or a queen.?

2) (4 points)

a. You are dealt three cards successively (**without replacement**) from a shuffled deck of 52 playing cards. Find the probability that all cards are black.

b. You are dealt three cards successively (**with replacement**) from a shuffled deck of 52 playing cards. Find the probability that all cards are black.

3) (6) The random variable X is the number of golf balls ordered by customers at a pro shop. Given the table of probabilities for X .

x	3	6	9	12	15
$P(X = x)$	0.14	0.21	0.36	0.19	0.10

a. Does this form a probability distribution? Explain.

b. Find the mean and standard deviation of the random variable.

d. Find the probability that number of golf balls ordered by customers is odd.

- 4) (6) In one large city, 73% of all voters are Democrats.
- If three voters are randomly selected for a survey, find the probability that all three are Democrats.
 - If three voters are randomly selected for a survey, find the probability that at least one of them is a Democrat.

Find the indicated probability.

- 5) (15) The table below shows the soft drink preferences of people in three age groups.

	cola	root beer	lemon - lime
under 21 years of age	40	25	20
between 21 and 40	35	20	30
over 40 years of age	20	30	35

- If one person is randomly selected, find the probability that the person is over 40 years of age.
- If one person is randomly selected, find the probability that the person is over 40 and drinks cola.
- If one person is randomly selected, find the probability that the person is over 40 or drinks cola.
- If two people are randomly selected, find the probability that both people are over 40.
- If one person is randomly selected, find the probability that the person prefers root beer given that person is under 21 of age.

(12) Draw the density curve and use a table of areas to find the specified area under the standard normal curve.

6) a. Find $P(0 < z < 3.01)$

b. Find $P(z > -2.27)$

c. Find $P(z < 0.59)$

d. Given $P(z < a) = 0.96$, find a .

7) (6) Assume that the weight loss for the first month of a diet program varies between 5 pounds and 12 pounds, and is spread evenly over the range of possibilities, so that there is a **uniform distribution**.

a. Find the probability of a random person lost more than 11 pounds

b. Find the probability of a random person lost between 8.5 pounds and 10 pounds.

(4) **Expected value.**

8) Suppose you buy 1 ticket for \$1 out of a lottery of 1,000 tickets where the prize for the one winning ticket is to be \$500. What is your expected value?

9) (15) A company manufactures calculators, and there is a 4% rate of defects. A batch of 50 calculators are randomly selected.

a. Find the probability of getting exactly 5 defects in a batch.

b. Find the probability of getting at most 4 defects in a batch.

c. Find the probability of getting at least 3 defects in a batch.

d. Find the mean and standard deviation of the number of defective calculators.

e. Would it be unusual to have 10 defective calculators in a batch? Explain.

(6) Provide an appropriate response.

10) A help desk receives an average of four calls per hour on its toll-free number. Use the Poisson distribution.

a. For any given hour, find the probability that it will receive exactly three calls.

b. For any given hour, find the probability that it will receive at least 2 calls.

(4) Find the indicated value.

11) a. $Z_{0.005}$

b. $Z_{0.01}$

(3) Counting.

12) There are 8 members on a board of directors. If they must form a subcommittee of 6 members, how many different subcommittees are possible?

(4) Solve the problem. Round to the nearest tenth unless indicated otherwise.

13) A bank's loan officer rates applicants for credit. The ratings are normally distributed with a mean of 200 and a standard deviation of 50. Find P_{60} , the score which separates the lower 60% from the top 40%.

(4) Solve the problem.

14) A class has 9 students who are to be assigned seating by lot. What is the probability that the students will be arranged in order from shortest to tallest? (Assume that no two students are the same height.)

(8) Find the indicated probability.

15) The incomes of trainees at a local mill are normally distributed with a mean of \$1100 and a standard deviation of \$150.

a. What percentage of trainees earn less than \$900 a month?

b. What percentage of trainees earn more than \$1500 a month?