The answers to these questions will be reviewed Thursday, May 6 at 10 a.m. in BLOC 165

CHAPTER 6 - SETS AND COUNTING

1. Which of the expressions below is the same as \((A \cup B)^c\)?
(a) \(A \cap B\) (b) \(A^c \cap B\) (c) \(A^c \cup B\) (d) \(A \cup B^c\)

2. Shade the region \(A \cap B^c \cup C\)

3. A survey of 100 off-campus college students revealed that in their apartments 40 had only cockroaches and silverfish, 30 had ants and 12 had only silverfish. Also, 18 had cockroaches and ants, 4 had ants and silverfish, two had all three of these pests and 10 had none of these pests. Show this information in a Venn diagram.

4. Find the number of possible 4-digit ID numbers where 0 can’t be used as the first digit and all four digits cannot be the same (for example, 1111 is not allowed)

5. How many ways can 3 boys and 2 girls be seated in a row if a boy must sit at either end of the row.

6. How many different 5 card hands are possible from a standard deck of 52 cards if exactly 3 of the cards are spades?

7. How many different arrangements are there of the letters in the work “statistics”?

8. A box contains 3 red, 4 green and one black jelly beans. In how many ways can a sample of 2 be selected from this box where all are the same color?

9. A recent survey of 110 shoppers at the supermarket found that 70 bought bread, 55 bought meat and 95 bought bread or meat. How many shoppers bought
a) only meat
b) neither of these items

10. Find the number of ways that a basketball team with 12 members can select a captain and a co-captain.

11. Three cards are drawn without replacement from a standard deck of 52 cards. How many ways can this be done if the cards are all kings or all jacks?

12. A committee of 4 is to be chosen from a group of 5 women and 6 men. How many ways can a committee be chosen if there is at least two women on the committee?
CHAPTER 7 - PROBABILITY

1. Write the uniform sample space for tossing a coin 3 times.

2. An urn contains 5 balls lettered A, B, C, D and E. A hat contains a slip of white paper and a slip of yellow paper. An experiment consists of choosing a ball from the urn and a slip of paper from the hat. What is the uniform sample space for this experiment?

3. The letters in the word "finite" are placed in a hat and a single letter is drawn. How many outcomes are in the uniform sample space for this experiment?

4. An experiment has a sample space \( \{a, b, c\} \). How many events are possible?

5. A single card is drawn from a standard deck of 52. What is the probability that
   a) it is a 6 or a jack?
   b) it is a 6 and a jack?
   c) it is a heart and a queen?
   d) it is a heart or a queen?

6. Two die are rolled. What are the odds in favor of rolling a sum of 7 or at least one 6?

7. A bowl contains 6 red, 4 blue and 2 yellow marbles. A sample of 3 marbles is chosen. What is the probability that
   a) all the marbles are blue?
   b) at least one marble is yellow?
   c) exactly two red marbles?

8. A store buys sweaters from suppliers A and B. They buy 80% of their sweaters from A and 20% from B. They find that 4% of the sweaters from A are defective and 7% of the sweaters from B are defective. What is the probability that a defective sweater came from supplier A?

9. A store receives a shipment of 27 new radios. There are 4 defective radios in the shipment. If 6 radios are chosen for display, what is the probability of at least one defective radio in the display?
10. Given two events, $A$ and $B$ with $P(A) = .7$, $P(B|A) = .2$ and $P(B|A^c) = .3$, find

a) $P(B)$

b) $P(A|B)$

c) $P(B^c|A)$

11. You have three computers available at your house. Suppose the probability of of computer A failing is 2%, computer B failing is 3% and computer C failing is 1%. If these probabilities are independent, what is the probability that

a) all will fail?

b) at least one will fail?

CHAPTER 8 - PROBABILITY DISTRIBUTIONS AND STATISTICS

An experiment consists of choosing a sample of 3 marbles from a jar that contains 3 blue and 4 green marbles. Let $X$ be the number of blue marbles in the sample.

1. Find the probability distribution table for the number of blue marbles in the sample.

2. Draw the probability histogram for the number of blue marbles in the sample.

3. What is the expected number of blue marbles in the sample?

4. Find the mean, median, mode and standard deviation for the number of blue marbles in the sample.

5. You play a game where you pay $8 to roll a die and you get back twice the number shown on the die in dollars. What is the expected value of this game?

6. You play a game where you get $50 if you have exactly two kings when dealt 4 cards. What is the most you should pay to play this game?
A new medicine is effective in 70 out of every 100 people who take it. If 10 of your patients are given this medicine,

7. Find the probability distribution table for the number of patients that find it effective.

8. What is the expected number of successes? What is the standard deviation?

9. If 1000 patients are given this medicine, use the normal curve approximation to the binomial distribution to find the probability that
   a) more than 75 patients find the medicine effective.
   b) Fewer than 70 patients find the medicine effective.
   c) between 65 and 75 patients find the medicine effective.

10. Given that $X$ is a normal random variable with $\mu = 50$ and $\sigma = 5$,
   a) Find $P(X > 57)$
   b) Find $P(35 < X < 45)$
   c) Find $P(X < 40)$
   d) Find a value $c$ such that $P(X < c) = .4$
   e) Find a value $c$ such that $P(X > c) = .7$
   f) Find a value $c$ such that $P(50 - c < X < 50 + c) = .20$

11. A probability distribution has a mean of 10 and a standard deviation of 1.5. Use Chebychev’s theorem to estimate the probability that a randomly chosen data point is between 7 and 13.