Math 160 Special Assignment 1 Lowman Fall 2007

1. How many subsets does the set A = {a,b,c,d,e,f,g} have?
2. How many subsets of A = {a,b,c,d,e,f,g} are there that have at least 3 elements?
3. In how many ways can four red books, five green books and six blue books be arranged on a shelf if the red books must be grouped together and the green books must be grouped together?
4. How many permutations of the letters ABBCCCDDDDEIOU are there?
5. How many permutations of the letters aeiouBBCCCDDDD are there if the vowels must be together on either end of the sequence but not in any particular order.
6. How many permutations of the letters ABBCCCDDDDEIOU are there if the vowels must be in alphabetical order?
7. What is the probability that can you be Delta a five card poker hand that has three cards of one denomination and two of another denomination?
8. What is the probability that can you be dealt a five card poker hand that has two cards of one denomination ,two of a second denomination, and one card of a third denomination?
9. How many ways can 12 people be split into two teams of 6 if the two teams will compete against each other?
10. Two teams A and B are to play each other in a tournament where the first team to win five games wins. How many sequences are there? For example the sequence BAAAAA would indicate that team A won the tournament by winning all but the first game. There are no ties.
11. A box has 100 numbered balls in it, 30 black and 70 red. Four are picked at random. What is the probability that there are at least two red balls?
12. Given events C and D are mutually exclusive, P(C) = 1/2, and P(D) = 1/3
    Find $\boldsymbol{P(C \cup D)}$.
13. Given events A and B are independent, P(A) = 1/2 and P(B) = 1/3
    Find $\boldsymbol{P(A \cup B)}$.
14. Given $\boldsymbol{P(A') = .3}$, $\boldsymbol{P(B) = .5}$ and $\boldsymbol{P(A \cap B') = .4}$
    (a) determine if A and B are indepentent
    (b) determine if A and B are mutually exclusive
    (c) find $\boldsymbol{P(A' \cup B | A \cup B')}$
15. A box has 30 red balls, 35 green balls and 35 blue balls. Six balls are picked at random one at a time. Use the product rule for n-tuples to find the probability of getting (R,G,R,B,G,R). Order matters.

16. Use the probability found in the previous problem to determine the probability of getting 3 red, 2 green, and 1 blue in any order.

17. Use the **Classical Method** to check your answer in the previous problem. i.e. Assume an equiprobable sample space and use $\boldsymbol{P(A) = \frac{n(A)}{n(S)}}$

18. Experience in the Finite Math course suggests that of those students who get a grade C or better on exam I, 80% get C or better on exam II. Of those who get D or F on exam I, 60% get D or F on exam II. This class 85% got C or better on exam I. What percent of this class is likely to get C or better on exam II?

19. In a factory that produces a part for Ford trucks, machine 1 produces 10% of the parts and 80% of its parts are not defective, machine 2 produces 20% of the parts and 85% of its parts are not defective, machine 3 produces 30% of the parts and 90% of its parts are not defective, machine 4 produces 15% of the parts and 70% of its parts are not defective, machine 5 produces 10% of the parts and 75% of its parts are not defective, machine 6 produces 5% of the parts and 60% of its parts are not defective, machine 7 produces 10% of the parts and 78% of its are not defective.
    If at the end of the day a part is selected at random and it is defective what is the probability that it came from machine 6?

20. A group of 20 children is to divided into three groups for PE activities: soccer, basketball and football. In how many ways can this be accomplished if the first group is to have 6 children, the second 10 and the third 4?

21. Four cards are drawn from a deck of cards. What is probability exactly two of them are clubs.

22. Four cards are drawn from a deck of cards. What is probability that all of them are clubs, given that no spades were drawn?

23. In a class with 100 students let $\boldsymbol{M}$ be the number of students who take Math and $\boldsymbol{P}$ the set of students who take Physics. If $\boldsymbol{n(M \cap P') = 40}$, $\boldsymbol{n(M) = 60}$ and $\boldsymbol{n(P) = 20}$, find $\boldsymbol{n(M' \cap P)}$.

24. A committee consisting of a chairman, a secretary and 4 members is picked out of a group of 10 people. In how many ways can this be done?

25. In a family of 10 everybody votes either Democrat or Republican. In how many different ways can they vote for the upcoming elections?

26. There are two varieties of unfair coins: A and B. A gives heads with probability 40% and B gives heads with probability 20%. There are 5 coins of type A and 3 coins of type B. One is randomly chosen and tossed. What is the probability that a coin of type A had been chosen, given the fact that the outcome was tails.

27. Given: $\boldsymbol{n(U) = 40, n(A) = 10, n(B) = 15, n(C) = 20, n(A \cap B) = 5, n(A \cap C) = 6, n(B \cap C) = 7, n(A \cap B \cap C) = 2}$. Find $\boldsymbol{n(A \cap B' \cap C')}$ and show your work.

28. An order of award presentations has been devised for eight people: Jeff, Karen, Lyle, Maria, Norm, Olivia, Paul and Richard. In how many ways can the awards be presented if the third award is presented to Karen or Norm and the last award is to be presented to Lyle or Richard?

29. A box has 6 different books and 4 of them are red. In how many ways can the books be arranged on a shelf if the red books must stay together?

30. In how many ways can 5 married couples sit in a row if men and women alernate? In how many ways can 5 married couples sit in a row if no 2 women set next to each other?