

Math 160 Special Assignment 1 Lowman Summer 2012

1. How many non-empty subsets does the set $A = \{a,b,c,d,e,f,g,h\}$ have?
2. How many subsets of $A = \{a,b,c,d,e,f,g,h\}$ are there that have at least 2 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? All of the books are different.
4. In how many ways can four red books (all different), five green books (all green books are the same) and six blue books (all different) be arranged on a shelf if the red books must be grouped together and the green books must be grouped together?
5. How many permutations of the letters ABBBCCCCDDDDDEIOU are there?
6. How many permutations of the letters aeiouBBBCCCCDDDDD are there if the vowels must be together on either end if the vowels must be together on either end of the sequence but not in any particular order.
7. How many permutations of the letters ABBBCCCCDDDDDEIOU are there if the vowels must be in alphabetical order?
8. What is the probability that can you be delt a five card poker hand that has three cards of one denomination and two of another denomination? The deck has 52 cards.
9. Repeat the previous problem if all spades and kings are first removed from the deck.
10. 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?
11. Repeat the previous problem if all spades and kings are first removed from the deck.
12. How many ways can 10 people be split into two teams of 5 if the two teams will compete against each other?
13. How many ways can 2 people be split into two teams of 1 if the two teams will compete against each other?
14. Two teams A and B are to play each other in a tournament where the first team to win seven games wins. How many sequences are there? For example, the sequence BAAAAAAA would indicate that team A won the tournament by winning all but the first game. There are no ties.
15. A box has 100 numbered balls in it, 40 black and 60 red. Four are picked at random. What is the probability that there are at least two red balls?
16. Given events C and D are mutually exclusive, $P(C) = 1/2$, and $P(D) = 1/3$
Find $P(C \cup D)$.

17. Given events C and D are mutually exclusive, $P(C) = 1/2$, and $P(D) = 1/3$
Find $P(C' \cup D')$.
18. Given events A and B are independent, $P(A) = 1/2$ and $P(B) = 1/3$
Find $P(A \cup B)$.
19. Given events A and B are independent, $P(A) = 1/2$ and $P(B) = 1/3$
Find $P(A' \cup B)$.
20. Given $P(A') = .3$, $P(B) = .5$ and $P(A \cap B') = .4$
- determine if A and B are independent
 - determine if A and B are mutually exclusive
 - find $P(A' \cup B | A \cup B')$
21. A box has 25 red balls, 45 green balls and 30 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.
22. Use the probability found in the previous problem to determine the probability of getting 3 red, 2 green, and 1 blue in any order.
23. Use the **Classical Method** to check your answer in the previous problem. i.e. Assume an equiprobable sample space and use $P(A) = \frac{n(A)}{n(S)}$
24. 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?
25. 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?
26. A group of 20 children is to be 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 5 children, the second 11 and the third 4?
27. Four cards are drawn from a deck of 52 cards. What is probability that exactly two of them are clubs.

28. Four cards are drawn from a deck of cards. What is probability that all of them are clubs, given that no spades were drawn?
29. In a class with 100 students let M be the number of students who take Math and P the set of students who take Physics. If $n(M \cap P) = 40$, $n(M) = 60$ and $n(P) = 20$, find $n(M' \cap P)$.
30. 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?
31. In a family of 10 everybody votes either Democrat or Republican. In how many different ways can they vote for the upcoming elections?
32. 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.
33. Given: $n(U) = 40$, $n(A) = 10$, $n(B) = 15$, $n(C) = 20$, $n(A \cap B) = 5$, $n(A \cap C) = 6$, $n(B \cap C) = 7$, $n(A \cap B \cap C) = 2$. Find $n(A \cap B' \cap C')$ and show your work.
34. 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?
35. 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?
36. In how many ways can 5 married couples sit in a row if men and women alternate? In how many ways can 5 married couples sit in a row if no 2 women set next to each other?
37. Two year old Andy helped his mother unpack groceries. In the process he removed the labels from the cans of food (all the same size), and he played with the unlabeled cans. Four of the cans contained peaches, six contained vegetables, five contained soup, and three contained dog food. His mother plans to open three of these cans for dinner. What is the probability that she will open one can of vegetables?
38. If two fair dice are rolled, what is the probability that the sum on the dice is 7 or 11?
39. If two fair dice are rolled, what is the probability that the sum on the dice is 7 or 11 given that the sum is greater than 5?
40. It is known that the probably of drilling for and finding oil in Billy's neighborhood is one percent. There is a test for oil that gives the correct result 90% of the time when there is oil and 80% of the time when there is not oil. Billy paid a company to test for oil in his back yard and the test was positive for oil. Billy convinced his parents that it was better to invest in drilling for oil in their back yard than pay his tuition for College. They will make enough money from the oil for his parents to retire early and there will be no need for him to finish college. What is the probability that there actually is oil in Billy's back yard?