

American University of Beirut

Math 204 (Permutations and Combinations)

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1. Find n if :

a) $2 {}_n P_2 + 50 = {}_{2n} P_2$

b) ${}_n P_1 \times {}_{n+1} C_n = 6$

c) $\frac{{}_6 C_2}{{}_{n-1} P_1} - {}_5 C_3 = n^2$

2. Consider a deck of 52 cards,

- In how many ways can we choose 5 cards?
- If 5 cards are drawn, find the number of ways of getting:
 - a) 2 red and 3 black cards.
 - b) Exactly one red.
 - c) All hearts.
 - d) At least one ace.
 - e) No kings.

3. Mr. X, a traveling salesman, must visit 8 customers .In how many sequences can he make his visits?

4. You want to call a friend on the telephone; you remember the first 3 digits of her phone number, but have forgotten the last 3 digits.

- a) How many possibilities you have to try?
- b) How many possibilities you have to try, if you remember that the last two digits are even?
- c) How many possibilities you have to try if you remember that the last digit is not a 5?

5. The secret code of a safe consists of 5 digits.

- How many different codes can the owner of the safe compose?
- How many different codes can the owner of the safe compose **if**:
 - a) the digits are distinct
 - b) no two adjacent digits are alike?
 - c) the first three digits are even and the remaining digits are odd?
 - d) the first three digits are even?
 - e) the first three digits are even distinct digits and the remaining digits are odd?
 - f) the digits alternate between odd and even with the first three not equal to 1?
 - g) he knows that the digits of the code are: 2, 4, 5, 7, 9, but he forgot their order ?

6. Sami, Maya, Rima, Kamal, David and Hasan are the members of club N.
In how many ways could they do each of the following?
 - a) Line up all six for a photograph.
 - b) Select a male and a female to decorate for a party.
 - c) Select two members, one to open their next meeting and another to close it.
7. A marketing research group plans to interview five randomly selected consumers from a population of 50 consumers. In how many ways can the consumers be selected?
8. The students of a class are selected at random one after the other for an examination. In how many ways can we select the students so that the boys and the girls alternate?
 - a) If the class consists of 3 boys and 3 girls.
 - b) If the class consists of 4 boys and 3 girls.
9. An ice cream parlor has seven flavors of ice cream. Kristen wants to buy 4 flavors. In how many ways can she make her selection?
10. The ice cream shop offers 31 flavors. You order a double scoop cone. In how many different ways can the clerk put the ice cream on the cone if you want two different flavors?
11. There are seven competing athletes and 3 medals (gold, silver and bronze). In how many ways can the medals be awarded to three of the athletes?
12. A woman has 11 close friends, 7 women and 4 men.
 - a) In how many ways can she invite 5 of them to dinner?
 - b) In how many ways can she invite 3 women and two men?
 - c) In how many ways can she invite 5 of them to dinner if two of them are married and will not attend separately?
13. In how many ways can a photographer at a wedding arrange 7 people in a row from a group of 10 people, where the bride and the groom are among the 10 people if:
 - a) the bride must be in the picture?
 - b) Only one the bride or the groom must be in the picture?
14. A student has 12 books, 5 Mathematics 4 history and 3 English.
 - a) In how many ways can he place them on a shelf?
 - b) In how many ways can he place them on a shelf, so that all books of the same subject are together?

15. A boy has 9 toy cars and 7 toy planes. In how many ways can he give his little brother:
- a) any 5 toys from his collection.
 - b) 3 toy cars and 2 toy planes
 - c) 5 toys of the same kind
16. A box contains 7 red, 5 black and 6 white balls. If 6 balls are selected successively from the box , in how many ways can we choose :
- a) Any 6 balls from the box?
 - b) 4 red balls and two white?
 - c) 4 of the same color?
 - d) At least 5 red?
 - e) At least 1 red?
 - f) No black ball ?