

CS225: Quiz Over Week 8 Solutions

Question 1 (5 pts)

How many distinguishable ways can the letters of the word CONSONANTS be arranged in order?

Answer:

total no. of letters = 10

no. of N = 3, no. of O = 2, no. of S = 2,

total no. of ways to arrangement = $C(10, 3) * C(7, 2) * C(5, 2) * C(3, 1)$ or $10! /$

$[3! * 2! * 2!]$

Question 2 (15 pts)

a) How many permutations of the letters DUPLICATE contain the strings PL and CA in order ?

Here, we will count the permutations of DU\$!&TE where \$ is PL and & is CA : $P(7, 7) = 7!$

b) How many permutations of the letters DUPLICATE contain the letters CAT together (in order) as a unit?

Here, we count the permutations considering CAT as a unit. : $P(7, 7) = 7!$

c) How many permutations of the letters DUPLICATE contain C, A and T not to be together in any order ?

The number of strings in that case = Total number of permutations - permutations considering CAT together as a unit in any order = $9! - 3! * 7!$

Question 3 (15 pts)

Consider a bag of jelly beans that has 30 red, 30 yellow, and 30 green jelly beans.

a) How many color sequences can you get by drawing 6 beans from the bag? 3^6

b) How many color combinations of 10 beans have at most three yellow beans?

Number of combinations that has no yellow beans + Number of combinations that has one yellow bean + Number of combinations that has two yellow beans + Number of combinations that has three yellow beans = $C(2+10-1, 10) + C(2+9-1, 9) + C(2+8-1, 8) + C(2+7-1, 7) = 38$

Alternate solution:

Then, Selection of (≤ 3) = Total number of color combination of 10 beans from 3 different kinds - color combination of 6 beans from 3 different kinds contains at least 4 yellow beans = $C(10+3-1, 10) - C(6+3-1, 6) = C(12, 10) - C(8, 6) = 66 - 28 = 38$

c) How many color combinations of 10 beans have at least 7 yellow beans?

We can draw only 3 beans from 3 colors (red, green, or yellow).

So, the number of combinations that had at least 7 yellow beans is: $C(3+3-1, 3) = C(5, 3) = 10$

Question 4 (5 pts)

How many different combinations of nickles, dimes and quarters can a piggy bank contain if it has 20 coins in it?

$$C(3 + 20 - 1, 20) = C(22, 20) == 22! / 20! * 2!$$

Question 5 (10 pts)

Consider a class with 8 boys and 6 girls.

a) In how many ways can a committee of nine consisting of 5 girls and 4 boys be chosen?

$$C(8, 4) * C(6, 5)$$

b) How many of the possible ways a committee of six can be chosen at random from the class consists at most 3 girls ?

$$C(8, 3) * C(6, 3) + C(8, 4) * C(6, 2) + C(8, 5) * C(6, 1) + C(8, 6)$$