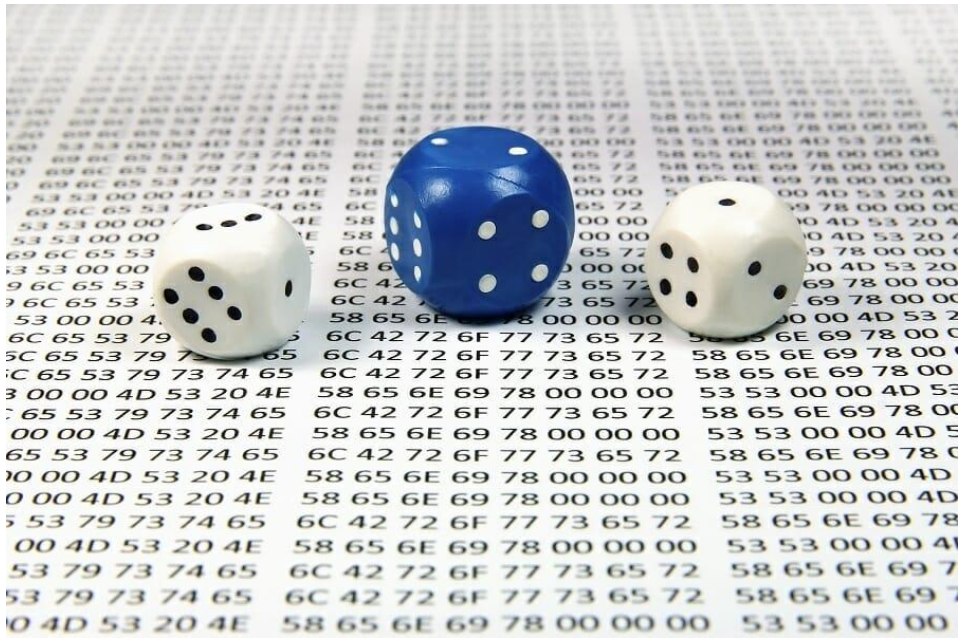

Counting Methods-Combinations

Instructor:
Emmanuel Thompson

Counting Methods-Combinations

Combination Formula (No Repetition, Order does not matter)

A combination is a grouping or subset of items.
For a combination, the order does not matters.

$$C(n,r) = {}^{n}C_{r} = \frac{n!}{(n-r)!r!}$$

Number of items in set

Number of items selected from the set

Counting Methods-Combinations

Q1:

A person going to a party was asked to bring 5 different bags of chips. Going to the store, she finds 17 varieties.

How many different selections can she make?

6188

$$C(n,r) = \frac{n!}{r!(n-r)!}$$

This is the link to an online calculator

$\frac{17!}{5!\cdot(17-5)!} = 6188$

$n=17, r=5 \quad C(17,5) = \frac{17!}{5!(17-5)!} = 6188$

Q2:

How many different 2 card hands can be dealt from a deck of 52 cards?

Your answer is :

$$C(n,r) = \frac{n!}{r!(n-r)!}$$

This is the link to an online calculator

$\frac{52!}{2!\cdot(52-2)!} = 1326$

$C(52,2) = \frac{52!}{2!(52-2)!} = 1326$

Counting Methods-Combinations

Q3:

A pizza parlor offers a choice of 16 different toppings. How many 2-topping pizzas are possible?

Your answer is : 120

$$C(n,r) = \frac{n!}{r!(n-r)!}$$

$$C(16,2) = \frac{16!}{2!(16-2)!} = 120$$

This is the link to an online calculator

$$\frac{16!}{2!\cdot(16-2)!} = 120$$

Q4:

A combination lock uses 4 numbers, each of which can be 0 to 38. If there are no restrictions on the numbers, how many possible combinations are available?

2313441

$$39 \cdot 39 \cdot 39 \cdot 39 = 39^4 = 2313441$$

Counting Methods-Combinations

Q5:

A computer user has downloaded 21 songs using an online file-sharing program and wants to create a CD-R with 11 songs to use in his portable CD player. If the order that the songs are placed on the CD-R is *not* important to him, how many different CD-Rs could he make from the 21 songs available to him?

There are 352716 possible CD-R's.

This is the link to an online calculator

$$C(n,r) = \frac{n!}{r!(n-r)!}$$

$$C(21,11) = \frac{21!}{11!(21-11)!} \approx$$

$$\frac{21!}{11!\cdot(21-11)!} = 352716$$

Q6:

In a lottery game, a player picks 9 numbers from 1 to 44. How many different choices does the player have if order doesn't matter?

There are 708930508 choices to pick for the lottery.

$$C(44,9) = \frac{44!}{9!(44-9)!} = 708930508$$

Counting Methods-Combinations

Q8:

At a charity benefit with 32 people in attendance, three $50 gift certificates are given away as door prizes. Assuming no person receives more than one prize, in how many different ways can the gift certificates be awarded?

4960

This is the link to an online calculator

$$C(n,r) = \frac{n!}{r!(n-r)!}$$

$C(32,3) = \frac{32!}{3!(32-3)!} \approx 4960$

$\frac{32!}{3!\cdot(32-3)!} = 4960$

( ) |

Q9:

There are 49 runners in a race, and no ties. In how many ways can the first three finishers be chosen from the 49 runners, regardless of how they are arranged?

This is the link to an online calculator

18424

$$C(n,r) = \frac{n!}{r!(n-r)!}$$

$C(49,3) = \frac{49!}{3!(49-3)!} \approx 18424$

Counting Methods-Combinations

Q10:

Compute the probability that a five-card poker hand is dealt to you that contains all hearts.

0.0004952

Number of ways of getting 5 Hearts:

$$C(13,5) = \frac{13!}{5!(13-5)!} = 1287$$

Number of ways of getting 5 cards:

$$C(52,5) = \frac{52!}{5!(52-5)!} = 2598960$$

$$\text{Probability} = \frac{1287}{2598960} = 0.0004952$$

Counting Methods-Combinations

Q11:

From a group of 8 people, you randomly select 2 of them.

What is the probability that they are the 2 oldest people in the group?

Give your answer as a fraction

$\frac{1}{28}$

Number of ways of selecting the 2 oldest people.

$$C(2,2) = \frac{2!}{2!(2-2)!} = 1$$

Number of ways selecting 2 people from 8 people.

$$C(8,2) = \frac{8!}{2!(8-2)!} = 28$$

$$\text{Probability} = \frac{1}{28}$$