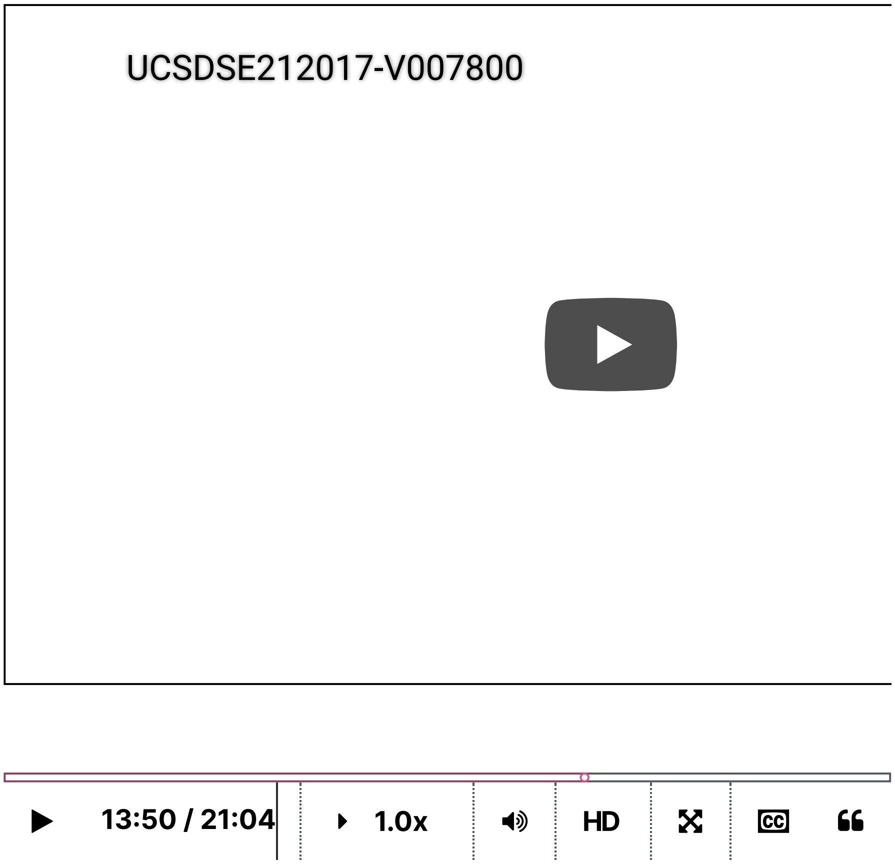
Problem Sets due May 4, 2022 18:05 +03

Video



be 48.

And we can just look at the compliment of this set

relative to all possible permutations.

And then by the subtraction rule, we get

the total number of permutations or anagrams

where A and R are not adjacent is

five factorial, is the total number of permutations

minus 48, so 120 minus 48,

namely, 72.

Now let's look at more additional constrained permutations.

So how many ways can you

4.1_Combinatorics_Permutations

General comment

Unless other stated, in this and subsequent sections, the following are assumed to be different (distinguishable):
People (including, men, women, children, soccer players, etc.)
Orientations (left to right or right to left)
Rotations (around a circle)

POLL

How many permutations does the set {1,2,3,4} have?

RESULTS

9	**0%**
18	**0%**
24	**92%**
36	**8%**

Submit

Results gathered from 13 respondents.

FEEDBACK

4! = 24

1

0 points possible (ungraded)

$0! =$

- 0
- 1
- ∞
- undefined

✓

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

2

0 points possible (ungraded)

Which of the following are true for all $n, m \in \mathbb{N}$ and $n \geq 1$.

- [x] $n! = n \cdot (n-1)!$
- [ ] $(n \cdot m)! = n! \cdot m!$
- [ ] $(n+m)! = n! + m!$
- [ ] $(n^m)! = (n!)^m$

✓

Submit You have used 1 of 4 attempts

Answers are displayed within the problem

3

0 points possible (ungraded)

In how many ways can 11 soccer players form a line before a game?

- ( ) 11
- ( ) 11^2
- (•) $11!$
- ( ) None of the above

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

4 (Graded)

2/2 points (graded)

In how many ways can 8 identical rooks be placed on an 8×8 chessboard so that none can capture any other, namely no row and no column contains more than one rook?

40320

Answer: 40320

40320

Explanation

Since there are 8 rooks and 8 rows, each with at most one rook, each row must have exactly one rook. In the first row, there are 8 options for the location of the rook, and once that is chosen, there are 7 options for the second row, etc. Hence the number of ways to place the rooks is $8 \cdot 7 \cdot \ldots \cdot 2 \cdot 1 = 8! = 40,320$.

Submit You have used 1 of 4 attempts

Answers are displayed within the problem

5

0 points possible (ungraded)

In how many ways can 8 distinguishable rooks be placed on an 8×8 chessboard so that none can capture any other, namely no row and no column contains more than one rook?

For example, in a 2×2 chessboard, you can place 2 rooks labled 'a' and 'b' in 4 ways. There are 4 locations to place 'a', and that location determines the location of 'b'.

1625702400

✔ **Answer:** 1625702400

1625702400

Explanation

You can eithr solve this based on the previous problem. There are $8!$ ways to place identical rooks. And once that is done, you can label them in $8!$ ways.
Alternatively, from scratch, there are 64 choices for the first rook, and once the first is placed, one row and column are ruled out for the second , resulting in 49 choices for the second, and so on. Therefore, number of ways is
$64 \cdot 49 \cdot \ldots \cdot 4 \cdot 1 = 8!^2 = 1625702400.$

Submit

You have used 2 of 4 attempts

Answers are displayed within the problem

6

0 points possible (ungraded)

In how many ways can 7 men and 7 women can sit around a table so that men and women alternate. Assume that all rotations of a configuration are identical hence counted as just one.

5040*720

✔ **Answer:** 3628800

$5040 \cdot 720$

Explanation

When rotations don't matter, there are 6! ways to seat the women. For each such configuration, there are 7! ways to seat the men. The total number of configurations is therefore 6!*7!=3,628,800.

Submit

You have used 3 of 4 attempts

Answers are displayed within the problem

7 (Graded)

2/4 points (graded)

In how many ways can three couples be seated in a row so that each couple sits stogether (namely next to each other):

- in a row,

48

✔ **Answer:** 48

48

Explanation

There are $3!$ ways to decide on the order of the couples, and then 2^3 ways to determine the order for each couple, hence a total of $3! \cdot 2^3 = 48$ ways.

- in a circle?

12

✖ **Answer:** 96

12

Explanation

Configuration where the mark is between two couples correspond to configurations in a row, hence there are $3! \cdot 2^3 = 48$ of them. Furthermore each circular shift of such a configuration results in one where the mark separates two members of the same couple. Hence there are also 48 such configurations, and the total number of configurations is $48 \cdot 2 = 96$.

Submit

You have used 4 of 4 attempts

Answers are displayed within the problem

Discussion

Hide Discussion

Topic: Topic 4 / Permutations

Add a Post

Show all posts by recent activity

There are no posts in this topic yet.

✖