CS1800 Fall 2026

Distinguishability & overcounting: How many ways... ?

Where to start...?

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	Repetition NOT OK	Repetition OK
Order Matters		
Order Doesn't Matter		

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There are 25 players on the Red Sox roster. How many ways to choose 9 starters, if anyone could play any position?

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Box 3

$$\binom{25}{9} = 2,042,975$$

$$= \frac{25!}{9!\,16!}$$

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A = 1st
B = 2nd
C = 3rd

$\neq$

B = 1st
C = 2nd
A = 3rd

$$P(25,3) = \frac{25!}{22!} = 25 \cdot 24 \cdot 23$$

$$= 13{,}800$$

order matters

no repetition

You have 5 pink socks and 8 orange socks. How many ways to pick two socks?

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You have 5 pink socks and 8 orange socks. How many ways to pick two socks?

- picking P, O = O, P order doesn't matter
- repetition ok! O, O and P, P are both valid

Pink | orange

(5, 8 #s don't really matter!)

$\binom{\#\text{stars} + \#\text{bars}}{\#\text{bars}}$

#stars = 2

#bars = 1

$\binom{3}{1} = 3$

** | P, P

* | * P, O

| ** O, O

How many ways to assign 4 of the 6 CS1800/1802 instructors to 4 different classrooms?

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How many ways to assign 4 of the 6 CS1800/1802 instructors to 4 different classrooms?

A
B
C
D
E
F
instr

rep ok?

A - HT130

A - R1458 xx

rep not ok

order matter?

A - HT130
B - R1458

≠

A - R1458
B - HT130

order matters!

$$P(6,4) = \frac{6!}{(6-4)!} = \frac{6!}{2!} = 6 \cdot 5 \cdot 4 \cdot 3 = 360$$

How many ways to pick 4 of the 6 CS1800/1802 instructors to get a raise?

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rep not ok: A A B A xxxx

order doesn't matter: A, B same!
B, A

$$\binom{6}{4} = \frac{6!}{2!4!} = 15$$

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How many five-card hands have a pair (2 cards the same value; no other pairs/matching)?

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How many ways to arrange the stuffies on the shelves?



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How many ways to split up 10 students into Sec1 with 5 people and Sec 2 with 5 people?



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How many ways to split up 10 students into Sec1 with 5 people and Sec 2 with 5 people?



How many ways to split up 10 students into two groups of 5?

don’t answer yet; this one is different!

How many ways to arrange the letters *N O R T H*?



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How many ways to arrange the letters *N O R T H*?



How many ways to arrange the letters *E A S T E R N*?



don’t answer yet; this one is different!