

# CIT 5920 — Lecture 8: Tricky Combinatorics

26 - 26 Sep 2024

Poll results

# Table of contents

- What should we start with?
- Describe how you are feeling about the material so far in one word:
- Quiz: The bijection principle

## What should we start with?

0 3 4

Take questions about administrivia



44 %

A quiz on the bijection principle



65 %

Examples of combinations



68 %

Examples of permutations



71 %

New topic: Arrangements with Non-Distinct Objects



53 %

New topic: Counting Integer Solutions (Stars and Bars Method)



62 %

Describe how you are feeling about the material so far in one word:

031



Quiz: The bijection principle (1/5)

0 4 2

**Consider the set of all possible 5-card hands from a standard 52-card deck. Which of the following sets can be put in bijection with this set to make it easier to count?**

Set of all 5-digit binary numbers

 2 %

Set of all permutations of 5 distinct digits from 0 to 9

 7 %

Set of all 5-letter words formed from the English alphabet

 14 %

Set of all sequences of 5 distinct elements chosen from a set of 52 distinct elements



 76 %

Quiz: The bijection principle (2/5)

039

**Consider the set of all possible arrangements of 8 distinct books on a shelf. Which of the following sets can be put in bijection with this set to make it easier to count?**

Set of all 8-digit binary numbers

 5 %

Set of all permutations of 8 distinct digits from 1 to 8 ✓

 90 %

Set of all 8-letter words formed from the English alphabet

 0 %

Set of all sequences of 8 elements chosen from a set of 10 distinct elements

 5 %

Quiz: The bijection principle (3/5)

0 3 9

**Consider the set of all possible ways to distribute 10 identical apples among 4 distinct baskets. Which of the following sets can be put in bijection with this set to make it easier to count?**

Set of all 10-digit binary numbers

 8 %

Set of all sequences of 13 elements consisting of ten 'A's and three 'B's

  
 13 %

Set of all 10-letter words formed from the English alphabet

 8 %

Set of all sequences of 10 elements chosen from a set of 4 distinct elements

 72 %

Quiz: The bijection principle (4/5)

0 3 8

**Consider the set of all possible 7-character passwords formed from the 26 lowercase letters of the English alphabet, where repetition is allowed. Which of the following sets can be put in bijection with this set to make it easier to count?**

(1/2)

Set of all 7-digit decimal numbers

☐ 3 %

Set of all sequences of 7 elements chosen from a set of 26 distinct elements



 76 %

Set of all 7-letter words formed from the English alphabet without repetition

☐ 3 %



Quiz: The bijection principle (4/5)

0 3 8

**Consider the set of all possible 7-character passwords formed from the 26 lowercase letters of the English alphabet, where repetition is allowed. Which of the following sets can be put in bijection with this set to make it easier to count?**

(2/2)

Set of all permutations of 7 distinct digits from 0 to 9

☐ 0 %

Set of all subsets of size 7 of the English alphabet

☒ 18 %

Quiz: The bijection principle (5/5)

0 4 0

**To find the number of onto functions from a 5-element set to a 3-element set, we can count the opposite: functions where at least one element in the 3-element set is unused. Which set represents this opposite scenario?**

(1/2)

Set of all functions from A to B where at least one element in B has no pre-image in A.



Set of all injective functions from A to B.



Set of all bijective functions from A to B.



Quiz: The bijection principle (5/5)

0 4 0

**To find the number of onto functions from a 5-element set to a 3-element set, we can count the opposite: functions where at least one element in the 3-element set is unused. Which set represents this opposite scenario?**

(2/2)

Set of all functions from A to B where each element in B has exactly one pre-image in A.

 15 %