

Math 2001 - Assignment 7

Due October 17, 2025

- (1) How many lists of length 4 are there with entries from A, \dots, Z if
 - (a) repetition is not allowed and the order of entries matters,
 - (b) repetition is allowed and the order of entries matters,
 - (c) repetition is not allowed and the order of entries does not matter,
 - (d) repetition is not allowed and the order of entries does not matter.
- (2) How many 5-letter “words” can you form from the alphabet A, \dots, Z if the letters are in alphabetical order and
 - (a) repetitions are not allowed, e.g., BEFST.
Hint: Such a word is uniquely determined by which letters from A, \dots, Z occur in it. Which of our standard models for counting lists applies?
 - (b) repetitions are allowed, e.g., BFFSS.
Hint: Every such word is uniquely determined by how often each letter from A, \dots, Z occurs in it.
- (3)
 - (a) In how many ways can you put 7 identical balls into 3 rooms so that every room contains at least one ball?
 - (b) [1, Section 3.8]: Exercise 14
- (4) [1, Section 3.8]: Exercises 4 and 5
- (5)
 - (a) In how many different ways can you line up n people?
 - (b) In how many different ways can you line up n people in a circle?
Hint: Since a circle has no beginning or end, two arrangements are the same if one is obtained from the other by rotation, e.g., the following are considered equal:



Represent arrangements by lists. When do 2 lists describe the same arrangement?

- (6) In how many different ways can n students (called A, B, \dots) line up in a queue for the cafeteria such that
 - (a) students A and B stand next to each other?
 - (b) students A and B do not stand next to each other?

REFERENCES

- [1] Richard Hammack. The Book of Proof. Creative Commons, 3rd edition, 2018. Available for free: <http://www.people.vcu.edu/~rhammack/BookOfProof/>