

ENEE324, Home assignment 1. Date due February 14, 2026, 11:59pm EST.

Instructor: Alexander Barg

Please upload your work as a **single PDF file** to ELMS (under the "Assignments" tab)

- Submissions on paper or by email will not be accepted.
- Please do not submit your solutions as multiple separate files (pictures of individual pages). Such submissions are difficult to grade and will not be accepted.
- Justification of solutions is required.
- Each problem is worth 10 points.

Problem 1. A password consists of 2 symbols chosen from $\{!, @, \#, \$\}$, followed by 3 letters, followed by 2 digits.

- How many different passwords are possible if repetition is allowed everywhere?
- How many passwords are possible if no character (symbol, letter, or digit) may repeat?
- How many passwords are possible if letters may repeat, but digits and symbols may not?

Problem 2. A box contains 5 red balls, 4 blue balls, and 3 green balls. Two balls are drawn sequentially without replacement.

- How many ordered outcomes are possible? (*ordered* means that the choice RB is different from BR)
- How many outcomes result in drawing two balls of different colors?
- What is the probability that at least one of the two balls drawn is green?

Problem 3. You distribute 10 identical tokens among 4 distinct boxes.

- How many possible distributions are there?
- How many distributions are there if each box receives at least two tokens?
- How many distributions are there if no box receives more than 5 tokens?

Problem 4. A committee of 3 people is chosen from a group of 6 faculty members and 4 graduate students.

- How many committees are possible?
- How many committees contain at least one graduate student?
- What is the probability that a randomly chosen committee contains more faculty members than graduate students?

Problem 5. At a conference with 150 attendees, 80 attended Workshop A, 65 attended Workshop B, and 40 attended both workshops.

- Draw a Venn diagram and label all regions with their numerical values.
- How many attendees attended neither workshop?
- How many attended exactly one workshop?
- How many attended Workshop B but not Workshop A?
- Express, in set notation and simplified form, the set of attendees who attended at most one of the two workshops.

Problem 6. For each comparison below, fill in the blank with $=$, $<$, or $>$, and briefly justify your answer.

- $\#(\text{ways to choose 3 books from 10})$ ---- $\#(\text{ways to choose 7 books from 10})$

- (b) $\#(\text{ways to arrange 5 people in a row})$ ---- $\#(\text{ways to seat 5 people around a circular table})$
- (c) $P(\text{rolling a sum of 7 with two dice})$ ---- $P(\text{rolling a sum of 8 with two dice})$
- (d) $P(\text{at least one 6 in two rolls})$ ---- $P(\text{exactly one 6 in two rolls})$?