CS1800
Fall 2025
Recitation 8 - Practice Questions for Homework 5
October 29 & 30, 2025 🎃

Recitations

CS1802 Recitations are dedicated time set aside to work on practice problems that specifically prepare you for the current homework or upcoming quiz.

Recitations are in-person and attendance is expected.

The solutions are published at the same time as the problems, so you can check your work. There is no need to submit anything.

Approaching the Problems

These practice problems are labelled according to which Homework or Quiz topic they will help you prepare for. You do not need to complete every practice question; we encourage you to do at least one per topic, and to prioritize the topics you would like to practice.

Instructors & Teaching Assistants

Your recitation is led by a Khoury College professor, assisted by a knowledgeable and wonderful Teaching Assistant. Professors and TAs are fantastic resources, and you have the opportunity in recitation to work with them in a smaller group -- I strongly recommend you take advantage of the time to review your solutions to these practice problems, ask for help on the homework, or review material from lecture.

Practice Problems for Pigeonhole (HW5, Q1)

A The 11 thieves from the movie *Ocean's 11* decide to get hotel rooms at the casino they're robbing. They book 6 rooms. At least one room is guaranteed to have at least how many thieves?

B The 11 thieves from the movie *Ocean's 11* decide to get hotel rooms at the casino they're robbing. What is the minimum number of rooms they need to book to guarantee that no one shares a room with more than 3 people (i.e., no more than 4 total people per room)?

C You can order a meal-deal at Veggie Galaxy with a vegan sandwich, fries, and a drink. There are three options for the sandwich, three for the fries, and three for the drink.

What is the minimum number of customers at Veggie Galaxy needed to guarantee that at least two orders will be identical?

D There are 50 baskets of apples. Each basket contains at least one but no more than 24 apples. Show that there are at least 3 baskets containing the same number of apples.

Practice Problems for Conditional Probability (HW5, Question 2)

A Suppose we have a bit string of length 5, randomly generated such that all bit strings are equally likely. What is the probability that the string contains at least three consecutive ones, given that the first bit is a zero?

Coco Gauff has a bucket of tennis balls at the U.S Open; 25 of the tennis balls are pink and 50 of them are orange.

B Coco draw three tennis balls at random. What is the probability that none of them is pink?

C Coco draws 3 tennis balls at random from the bucket. She sees that one of them is pink. What is the probability that she got exactly three pink tennis balls, given that she knows she got at least one pink tennis ball?

Practice Problems for Expected Value (HW5, Question 3)

Compute the expected value of each of the experiments in Parts A and B. Assume that the die faces are numbered $1, 2, \ldots, n$ for an n-sided die and that all outcomes are equally likely.

A A 3-sided die.

B A 4-sided die.

C Is the expected value of a 6-sided die less than or greater than the value of an 8-sided die? Why?

D You are dealt 2 cards face down from a standard 52-card deck. The deck contains 26 red cards (all the hearts and all the diamonds). How many red cards would you expect to receive in your 2-card hand?

E Laney is playing video poker, always bets $30 on a single hand. Then, one of two things happens:

- She loses the hand, and loses her $30.
- She wins the hand, and profits $60 (that's a total return of $90).

No other outcomes are possible. What would the probability of winning need to be in order for Laney to expect to profit at least $50?

Practice Problems for Bayes Rule (HW5, Question 4)

A Kasing Lung uses three machines, X, Y, and Z to produce Labubus.

Suppose:

- Machine X produces 50% of the Labubus, of which 3% are defective
- Machine Y produces 30% of the Labubus, of which 4% are defective
- Machine Z produces 20% of the Labubus, of which 5% are defective.

Find the probability that a randomly selected Labubu is defective.

B Suppose a defective Labubu is found at the factory. Which machine is most likely to have built it?

Practice Problems for (HW5, Question 5)

There are 6 different types of pies at Thanksgiving (pumpkin, pecan, apple, cherry, chocolate custard, and sweet potato). There is plenty to go around, and Laney picks 3 slices of pie at random.

A Assuming order doesn't matter and Laney doesn't mind repeating flavors, how many ways are there for her to have three slices of pie?

B Assuming all outcomes are equally likely (e.g., having 3 slices of cherry is just as likely as two sweet potato and one pecan), what is the probability that Laney gets exactly two slices of pumpkin pie?

C Assuming all outcomes are equally likely (e.g., having 3 slices of cherry is just as likely as two sweet potato and one pecan), what is the probability that Laney gets **at least** two slices of pumpkin pie?

D Assuming all outcomes are equally likely (e.g., having 3 slices of cherry is just as likely as two sweet potato and one pecan), what is the probability that Laney gets three different flavors of pie?

E Assuming all outcomes are equally likely (e.g., having 3 slices of cherry is just as likely as two sweet potato and one pecan), what is the probability that Laney gets only one flavor of pie?

D What is the expected number of distinct pie flavors on Laney's plate?