

## Homework 2

- Due by 2025.03.19 9:11AM
  - Answers without due explanation/reasoning will not be graded.
1. Draw 2 cards in sequence without replacement from a deck of 52 cards. Let  $A$  be the event that the first drawn card is an Ace, and  $B$  be the event that the second drawn card is a black-suit (i.e. Spades or Clubs) card.
    - What is the conditional probability  $P(A|B)$ ?
    - What is the conditional probability  $P(B|A)$ ?
  2. Consider a class of 10 girls and 10 boys. Assume birthdays are uniformly distributed over 365 calendar days for the students. Estimate the probability that exactly one boy-girl pair have adjacent birthdays
    - by the Poisson distribution for rare events
    - by simulation (specify the number of trials and the relative frequency)
  3. Consider the 5-door version of the Monty-Hall problem. Suppose Guest chooses Door 1 and Host opens Door 5. Decide the (conditional) probability that car is behind Door 3.
  4. Romeo and Juliet have a date, for which each arrives with a delay between 0 and 1 hour, with all pairs of delays being equally likely. Romeo waits at most 30 minutes and Juliet waits at most 20 minutes.
    - Find the probability that they miss each other.
    - Given the miss, what is the probability that Juliet arrives first?
  5. In bridge, a hand consists of 13 cards dealt from a well-shuffled deck of cards.
    - Find the probability that the hand is void in Hearts.
    - Find the probability that the hand contains no void suits.