

Homework #1
Coverage: chapter 1–2
Due date: 17 March, 2022

Instructor: Chong-Yung Chi

TAs: Meng-Ying Chiang & Ting-Jie Huang & Meng-Syuan Lin & Chien-Wei Huang

Notice:

1. Please hand in the hardcopy of your answer sheets to the TAs by yourself before the deadline.
2. Answers to the problem set should be written on the A4 papers.
3. Write your name, student ID, and department on the beginning of your answer sheets.
4. Please do the homework independently by yourself, and support your answers with clear, logical and solid reasoning or proofs.
5. We will grade the homework and provide the solutions afterwards.

Problem 1.2.10. (10 points) Define a sample space for the experiment of drawing two coins from a purse that contains two quarters, three nickels, one dime, and four pennies. For the same experiment describe the following events:

- (a) drawing 26 cents;
- (b) drawing more than 9 but less than 25 cents;
- (c) drawing 29 cents.

Problem 1.4.6. (10 points) In a probability test, for two events E and F of a sample space, Tina's calculations resulted in $P(E) = 1/4$, $P(F) = 1/2$, and $P(EF) = 3/8$. Is it possible that Tina made a mistake in her calculations? Why or why not?

Problem 1.7.12. (10 points) A point is selected at random from the interval $(0, 1)$. What is the probability that it is rational? What is the probability that it is irrational?

Problem Ch1-Review 30. (10 points) A number is selected at random from the set of natural numbers $\{1, 2, 3, \dots, 1000\}$. What is the probability that it is not divisible by 4, 7, or 9?

Problem 2.2.36 (10 points) What is the probability that a random r -digit number ($r \geq 3$) contains at least one 0, at least one 1, and at least one 2?

Problem 2.3.18. (10 points) The letters in the word SUPERCALIFRAGILISTICEXPIALIDOCIOUS are arranged randomly. (a) How many of the distinguishable arrangements begin with G and end with X? (b) What is the probability that the outcome begins with G and ends with X?

Problem 2.3.26. (10 points) If we put five math, six biology, eight history, and three literature books on a bookshelf at random, what is the probability that all the math books are together?

Problem 2.4.38. (10 points) A history professor who teaches three classes of the same course every semester decides to make several tests and use them for the next 10 years (20 semesters) as final exams. The professor has two policies: (1) not to give the same test to more than one class in a semester, and (2) not to repeat the same combination of three tests for any two semesters. Determine the minimum number of different tests that the professor should prepare.

Problem 2.4.50. (10 points) In a closet there are 10 pairs of shoes. If six shoes are selected at random, what is the probability of (a) no complete pairs; (b) exactly one complete pair; (c) exactly two complete pairs; (d) exactly three complete pairs?

Problem Ch2-Review 36. (10 points) An ordinary deck of 52 cards is dealt, 13 each, at random among A, B, C, and D. What is the probability that (a) A and B together get two aces; (b) A gets all the face cards; (c) A gets five hearts and B gets the remaining eight hearts?

References

- [1] Saeed Ghahramani, *Fundamentals of Probability: With Stochastic Processes*, Chapman and Hall/CRC; 4th edition (September 4, 2018)