INFO510 Bayesian modelling and inference Fall2025

Homework 2

Total points – 25

Instructions:

- Please submit a single PDF file for all the questions. If you have used any scripting language to answer these questions, submit additional script files (.r, .rmd, .py, .pynb, etc) along with the PDF.
- Any code and written solutions **must be your own**. Do not copy code or solutions. If you write scripts for any question, clearly note in your pdf which script file corresponds to which of the answers.
- Clearly label all the files, do not write generic labels for your file.
- The pdf file containing all the answers should be in the following format, <last name, first name_INFO510_homework2>

Q.1: In one type of state lottery, you pick 5 distinct numbers from 1; 2; 3; ……; 40. Then on Saturday night the 5 distinct winning numbers are picked on television uniformly at random. What is the probability that you picked exactly two winning numbers? (**5 points**)

Q.2: We flip a fair coin five times. For every heads you pay me $1 and for every tails I pay you $1. Let X denote my net winnings at the end of five flips. Find the range and the probability mass function of X (**5 points**)

Q.3: Three events A, B and C satisfy the following: A and B are independent, C is a subset of B, C is disjoint from A, P(A) = 1=2, P(B) = 1=4 and P(C) = 1=10. Compute P(A∪ B ∪ C) (**5 points**)

Q.4: A bag contains 3 kinds of dice: seven 4-sided dice, three 6-sided dice, and two 12-sided dice. A die is drawn from the bag and then rolled, producing a number. For example, the 12-sided die could be chosen and rolled, producing the number 10. Assume that each die is equally likely to be drawn from the bag. (**10 points**)

(a) What is the probability that the number 6 is rolled?

(b) What is the probability that a 6-sided die was chosen, given that the number 6 was rolled?