IE6400 Fall 2023 Assignment 4 (100 points)

Problem 1 (30 points): The loaves of rye bread distributed to local stores by a certain bakery have an average length of 30 centimeters and a standard deviation of 2 centimeters. Assuming that the lengths are normally distributed, what percentage of the loaves are:

(a) longer than 31.7 centimeters?

(b) between 29.3 and 33.5 centimeters in length?

(c) shorter than 25.5 centimeters?

Problem 2 (20 points): Find the probability that a person flipping a coin gets:

(a) the third head on the seventh flip;

(b) the first head on the fourth flip.

Problem 3 (20 points): A manufacturing company uses an acceptance scheme on items from a production line before they are shipped. The plan is a two-stage one. Boxes of 25 items are readied for shipment, and a sample of 3 items is tested for defectives. If any defectives are found, the entire box is sent back for 100% screening. If no defectives are found, the box is shipped.

(a) What is the probability that a box containing 3 defectives will be shipped?

(b) What is the probability that a box containing only 1 defective will be sent back for screening?

Problem 4 (20 points): A traffic control engineer reports that 75% of the vehicles passing through a checkpoint are from within the state. What is the probability that fewer than 4 of the next 9 vehicles are from out of state?

Problem 5 (10 points): Suppose X follows a continuous uniform distribution from 1 to 5. Determine the conditional probability $P(X > 2.5|X \leq 4)$.

Submission Format

1. Submit solutions in .docx, .pdf, .ipynb, or handwritten format (scan and upload)
2. All the formulas used for numerical solutions must be included

3. If using .ipynb for formulas, use Text cells to write formulas before computing

4. Submit by 12 PM PT on November 2nd