Assignment 3

2023-10-26

This assignment can be performed on paper by hand (scan the document and submit to Canvas) or, if you feel comfortable, turning in a LaTeX document

1. Assume $X \sim \mathcal{U}(a, b)$. The density is:

$$f(x) = \int_a^b \frac{1}{b-a} dx$$

1a. Prove $\mathbb{E}[X]$, the expected value of X, is $\frac{a+b}{2}$

1b. Prove $\mathbb{V}[X]$, the variance of X, is $\frac{(b-a)^2}{12}$

2. Suppose you have flipped a coin 5 times in a row. It is a fair coin (ie the chance of getting heads or tails is even).

2a. What is the probability getting exactly 2 heads in these 5 flips?

2b. What is the probability getting 4 or more heads in these 5 flips?

3. For this problem, suppose an average of 10 guests dine at a restaurant per hour.

3a. What is the probability that 6 guests visit this restaurant in an hour?

3b. What is the probability 3 or less guests visit this restuarant in an hour?

4. Calculate $\Gamma(10)$

5. Calculate $\beta(8, 5)$