

Homework 1

*Instructor: Hang Zhou**Due date: 11:00am, Jan 22*

Homework is a crucial step in your learning journey for this course. I strongly suggest you spend time on it and complete it independently.

Question 1: Let X be the outcome of throwing a fair dice. Find $\mathbb{E}[(X - 3)^2]$.

Question 2: Let X be the outcome of throwing a fair dice. Find $\text{Var}[(X - 3)^2]$.

Question 3: Let X and Y be two random variables such that $\text{Var}[X] = 3$, $\text{Var}[Y] = 5$, and $\text{Var}[X + Y] = 2$. What is $\text{Cov}(X, Y)$?

Question 4: Let X and Y be the outcomes of throwing two independent fair dice. Find $\text{Cov}(2X - Y + 1, 3X + 2Y + 5)$.

Question 5: Suppose you are to toss a biased coin which lands on head with probability 0.2. Let $X = 1$ to denote the outcome for head, and $X = -1$ for the outcome for tail.

a). Find $\mathbb{E}[X]$ and $\text{Var}(X)$.

b). How many tosses until we could expect to see the coin landing on head?