Lab5 Ch4

February 15, 2023 10:07 AM

Exercise 4.1 Let $X \sim \text{Poisson}(\lambda)$. Find the expected value and variance of X.

Exercise 4.2 $E[X]$ when $X \sim \text{Binomial}(n, p)$

Exercise 4.3 The distribution of a random variable Y is:

y	50	100	200
$P(Y = y)$	0.2	0.5	0.3

Calculate the variance of Y.

Exercise 4.4 The pdf of a continuous variable X is given by

$$f(x) = \begin{cases} cx^2 & \text{if } 0 \leq x \leq 2 \\ 0 & \text{elsewhere} \end{cases}$$

where c is constant.

4.4.1 Find c.

4.4.2 Find the cdf $F(x)$.

4.4.3 What is $P(1 \leq X \leq 1.5)$?

4.4.4 Find $\mathbb{E}[X]$.

4.4.5 Find $\mathbb{V}\text{ar}[X]$.

Exercise 4.5 The cdf of a continuous variable X is given by

$$F(x) = \begin{cases} 1 - e^{-x} & \text{if } x > 0 \\ 0 & \text{elsewhere} \end{cases}$$

4.5.1 What is $P(X \leq 2.6)$?

4.5.2 What is $P(1 < X < 4)$?

4.5.3 Find the pdf $f(x)$.

Exercise 4.6 The height of women in a particular region follows a normal distribution with mean 1.55m and standard deviation 0.17m.

4.6.1 What proportion of women are smaller than 1.61m?

4.6.2 What proportion of women are taller than 1.8m?

4.6.3 What proportion of women are between 1.45m and 1.61m tall?

Exercise 4.7 The wingspans of the males of a certain species of bird of prey form a normal distribution with mean 162.50cm and standard deviation 6.0cm. What is the probability that the wingspan of a randomly selected male will exceed 170cm?

Exercise 4.8 Show that $\text{Cov}(X, Y) = \mathbb{E}[XY] - \mathbb{E}[X]\mathbb{E}[Y]$.

Exercise 4.9 Hence, show that if X and Y are independent then $\text{Cov}(X, Y) = 0$.