

Homework #5

Due on 9/30/2026, Wednesday, before class.

1. Exercise 6.3.9 on page 384

6.3.9. Let $X_1, X_2, \dots, X_n$ be a random sample from a Poisson distribution with mean $\theta > 0$.

- (a) Show that the likelihood ratio test of $H_0 : \theta = \theta_0$ versus $H_1 : \theta \neq \theta_0$ is based upon the statistic $Y = \sum_{i=1}^n X_i$. Obtain the null distribution of Y .
- (b) For $\theta_0 = 2$ and $n = 5$, find the significance level of the test that rejects H_0 if $Y \leq 4$ or $Y \geq 17$.

2. Exercise 6.4.3 on page 394 (Note: theta2 should be positive)

6.4.3. Let $X_1, X_2, \dots, X_n$ be iid, each with the distribution having pdf $f(x; \theta_1, \theta_2) = (1/\theta_2)e^{-(x-\theta_1)/\theta_2}$, $\theta_1 \leq x < \infty$, $-\infty < \theta_2 < \infty$, zero elsewhere. Find the maximum likelihood estimators of θ_1 and θ_2 .

3. Exercise 6.4.6 on page 394

6.4.6. Let $X_1, X_2, \dots, X_n$ be a random sample from $N(\mu, \sigma^2)$.

- (a) If the constant b is defined by the equation $P(X \leq b) = 0.90$, find the mle of b .
- (b) If c is given constant, find the mle of $P(X \leq c)$.