18.443. Practice test 2.

(1) Given a sample $5, 1, 4, 1, 2, 3$ from Poisson distribution $\Pi(\lambda)$, construct the most powerful test for

$$H_0 : \lambda = 1 \quad \text{vs.} \quad H_1 : \lambda = 2,$$

with level of significance $\alpha = 0.05$. Test H_0.

(2) p. 561, no. 1.

(3) p. 574, no. 4.

(4) Suppose that in the multiple linear regression model $Y = X\beta + \varepsilon$ with 20 observations, we have

$$\hat{\sigma}^2 = 1.5,\ \hat{\beta} = (1, 2, 1)^T,\ (X^T X)^{-1} = \begin{pmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{pmatrix}.$$

Test the hypothesis

$$H_0 : \beta_1 = 4 - 2\beta_3 \text{ and } \beta_2 = 0.5 + \beta_3$$

at the level of significance $\alpha = 0.05$.

(5) p. 672, no. 5.

(6) In two-way analysis of variance, how can we estimate the parameters μ_{ij} and test the hypothesis

$$H_0 : \text{ all } \mu_{ij} \text{ are equal?}$$

(7) In two-way analysis of variance, write parameters $\mu, \alpha_i, \beta_j, \gamma_{ij}$ in terms of parameters μ_{ij}.