IE241 Engineering Statistics 1 Homework 4

Due date : April 24

1. Solve the following questions in the textbook.
5.14
5.23
5.27
5.39
5.48
5.58
5.75
5.95
5.115
5.166

2. Let each of random variable $Y_1, \dots, Y_k$ be independently and identically follows a Poisson distribution with parameter λ_i $(i = 1, \dots, k)$ respectively. Given the condition $Y_1 + \cdots + Y_k = n$, find the conditional distribution of $(Y_1, \dots, Y_k)^T$.

3. $Y = (Y_1, \dots, Y_k)^T \sim Multinomial(n, (p_1, \dots, p_k)^T)$

For a random variable Y which follows a multinomial distribution, prove the below.

(a) $(Y_1, \dots, Y_r, n - Y_1 - \cdots - Y_r)^T \sim Multinomial(n, (p_1, \dots, p_r, 1 - p_1 - \cdots - p_r)^T)$ $(1 \leq r < k)$

(b) Given the condition that $Y_1 = y_1, \dots, Y_r = y_r$, calculate the conditional distribution of $(Y_{r+1}, \dots, Y_k)^T$.

$$f_{r+1,\dots,k|1,\dots,r}(y_{r+1}, \dots, y_k | y_1, \dots, y_r)$$