MA204: Mathematical Statistics

Assignment 2

Submit your solutions to Q2.1 $\sim$ Q2.10 on pages 99–101 of the textbook "Mathematical Statistics", plus the following two questions

2.11 Let $X_1 \sim \text{Poisson}(\lambda_1)$, $X_2 \sim \text{Poisson}(\lambda_2)$ and $X_1 \perp\!\!\!\perp X_2$, where $\lambda_1 > 0$ and $\lambda_2 > 0$.

(a) Find the distribution of $Y = X_2 - X_1$.

(b) Find $E(Y)$ and $\text{Var}(Y)$.

2.12 Let $X_1, X_2 \overset{\text{iid}}{\sim} \text{Exponential}(\lambda)$ with pdf $\lambda \exp(-\lambda x)$, $x \geqslant 0$.

(a) Find the joint density of $Y_1 = X_1 + X_2$ and $Y_2 = X_1/X_2$.

(b) Find the marginal distribution of Y_1.

(c) Find the marginal distribution of Y_2.