HW2

Q1 –

Likehood functioa is $L(\lambda) = \prod_{i=1}^{n} P(x_i ; \lambda)$

$$L(\lambda) = \prod_{i=1}^{n} \frac{e^{-\lambda}\lambda^{x}}{x!} = e^{-\lambda n} \lambda^{\sum_{i=1}^{n} x} \prod_{i=1}^{n} \frac{1}{x!}$$

$$\Rightarrow L(\lambda) = e^{-\lambda}\lambda \sum_{i=1}^{n} x_i \frac{1}{x_1!\, x_2! \cdots x_n!}$$

- To make easier we use log likehood

$$\ell(\lambda) = \ln L(\lambda)$$

$$= \ln\left(e^{-\lambda}\lambda \sum_{i=1}^{n} x_i \frac{1}{x_1!\, x_2! \cdots x_n!}\right)$$

$$= -n\lambda + \ln(\lambda) \sum_{i=1}^{n} x_i - \ln(x_1!\, x_2! \cdots x_n!)$$

$$= -n\lambda + \left(\sum_{i=1}^{n} x_i\right) \ln(\lambda) - \ln(x_1!\, x_2! \cdots x_n!)$$

we si

- to get max likehood method we get derivitei of $\ell(\lambda)$

$$\frac{d\ell(\lambda)}{d\lambda} = \frac{d}{d\lambda}\left(-n\lambda + \sum_{i=1}^{n} x_i\right) \ln(\lambda) - \ln(x_1! \cdots x_n!)$$

$$= -n + \frac{\sum_{i=1}^{n} x_i}{\lambda}$$

Hesaplamaları yaparken lecture 03 page 14, 15, 16 24, 25 den yararlandım.