Machine Learning.

Assignment Home-work - 2

Q2.

given,

$$f(x) = \frac{1}{2\sqrt{2\pi}} e^{-\frac{(x-\theta)^2}{8}}$$

measurements of the gene ~~expression~~ reported

= 10, 13, 15, 20.

Likelihood function is product of individual probabilities

is = $L(\theta) = \prod_{i=1}^{n} f(x_i)$

log-likelihood function $\Rightarrow$ Log $L(\theta) = \sum_{i=1}^{n} \log f(x_i)$

Substitution:

$$\log L(\theta) = \sum_{i-1}^{n} \left(- \frac{(x_i - \theta)^2}{8} \right) + \sum_{i-1}^{n} \log \left(\frac{1}{2\sqrt{2\pi}} \right)$$

As the 2nd term doesn't depend on θ, maximizing log $L(\theta)$ is equivalent to minimizing.

$$\sum_{i=1}^{n} (x_i - \theta)^2$$

$$\theta = \frac{1}{n} \sum_{i=1}^{n} x_i$$

Substitute the values given:

$$\theta = \frac{10+13+15+20}{4} = \frac{58}{4} = 14.5$$

$$\theta = 14.5$$