Question 2:

Manual Calculation

given probability density function

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

given measurements = 10,13,15 and 20

The likelihood function is the product of the individual probabilities:

These is mouninged when

$$L(0) = \mathop{\text{H}}_{i=1} f(x_i)$$

Taking the log-likelihood function:

$$\log L(0) = \sum_{i=1}^{n} \log f(x_i)$$

Substituting the given PDF:

$$\log L(0) = \sum_{i-1}^{n} \left(-\frac{(x_i-0)^2}{8}\right) + \sum_{i-1}^{n} \log \left(\frac{1}{2\sqrt{2\pi}}\right)$$

Since the second term does not depend on 0, maximizing log L(0) is equivalent to minimizing:

This is minimized when:

$$0 = \frac{1}{n} \sum_{i=1}^{n} \chi_i$$
 $i = 0$ 

Substituting the values:

Thus the MLE estimate for 0 is 14.5

L(0) = A P(xi)

2√2 E = C

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(e) = \(\frac{1}{2}\) (a) \(\frac{1}{2}\)

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