

Name: _____

Let $X_1, X_2, \dots, X_n \sim N(\mu, \sigma^2)$. Find the maximum likelihood estimator for μ .

Solution:

$$\begin{aligned}f(\underline{x}|\mu, \sigma) &= \left(\frac{1}{\sqrt{2\pi\sigma^2}}\right)^n e^{-\sum(X_i - \mu)^2/(2\sigma^2)} \\L(\mu, \sigma^2) &= -\frac{n}{2} \ln(2\pi\sigma^2) - \frac{\sum(X_i - \mu)^2}{(2\sigma^2)} \\ \frac{\partial L(\mu, \sigma^2)}{\partial \mu} &= -2 \frac{\sum(X_i - \mu)}{2\sigma^2} (-1) = 0 \\ \sum(X_i - \mu) &= 0 \\ \hat{\mu} &= \bar{X} \text{ is the MLE for } \mu\end{aligned}$$