6

Example 6: Suppose the weights of randomly selected American female college students are normally distributed with unknown mean μ and standard deviation σ. A random sample of 10 American female college students yielded the following weights (in pounds):

115 122 130 127 149 160 152 138 149 180

Based on the definitions given above, identify the likelihood function and the maximum likelihood estimator of μ, the mean weight of all American female college students. Using the given sample, find a maximum likelihood estimate of μ as well.

We saw in example 5 $MLE(\mu) = \frac{\sum x_i}{n}$

```
> x = c(115, ..., 180)
> mlemu = Sum(x) / length(x)    => mlemu = 142.2
> mean(x)
```

We also saw $MLE(\hat{\sigma}^2) = \frac{\sum (x_i - \bar{x})^2}{n}$

```
> mle var = Sum((x - mlemu)^2) / length(x)    => mle var = 347.96
```

We know $VAR(x) = \frac{\sum (x - \bar{x})^2}{n-1}$ So var(x) * (length(x) - 1) / length(x) = mle var

```
> var(x) * (length(x) - 1) / length(x)
```