Chapter 3 Homework

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3.1

The mean (sample average) for these data is 16.0291667. The sample standard deviation is calculated by

$$\hat{\sigma} = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

where $\bar{x}$ is the sample mean. For our sample this is equal to 0.0202073.

3.2

The data are

$$50.001, 50.002, 49.998, 50.006, 50.005, 49.996, 50.003, 50.004$$

The mean for these data is 50.001875.
The standard deviation for these data is 0.0034408.

3.3

The data are

$$953, 955, 948, 951, 957, 949, 954, 950, 959$$

The mean for these data is 952.8888889.
The standard deviation for these data is 3.7230513.

3.4

First I'd like to order the data

$$948, 949, 950, 951, 953, 954, 955, 957, 959$$

Now we'd just find the middle value to estimate the median with, the median is equal to 953. If our sample size remains the same, 9, then the largest value could be as large as infinity (or more practically, as high as our measurement device or furnace could go) without changing the median.

3.5

The data are

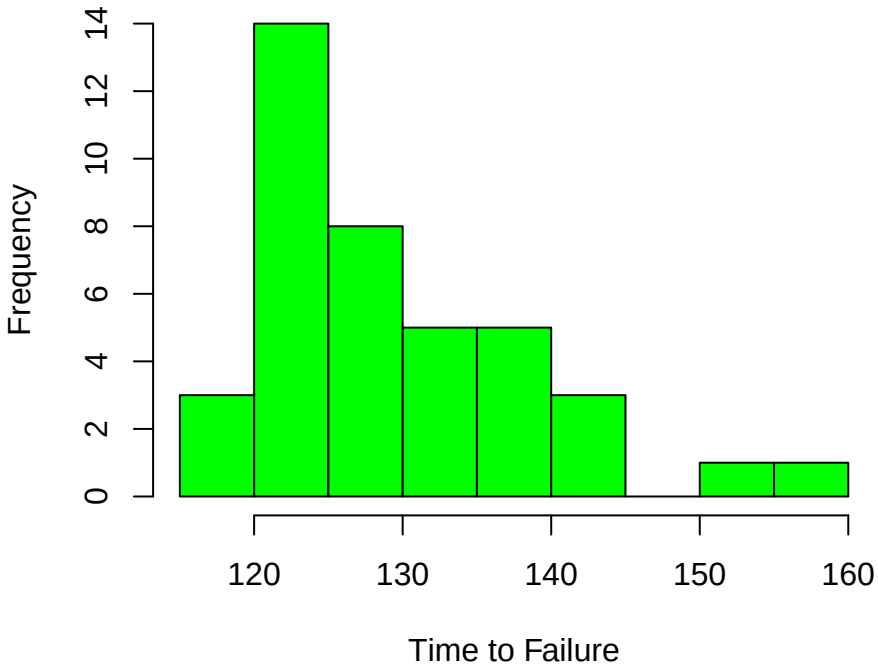
$$96, 102, 104, 108, 126, 128, 150, 156$$

The mean for these data is 121.25.
The standard deviation for these data is 22.6258386.

3.6

The mean for these data is 129.975.
The standard deviation for these data is 8.9140842

A histogram is below:

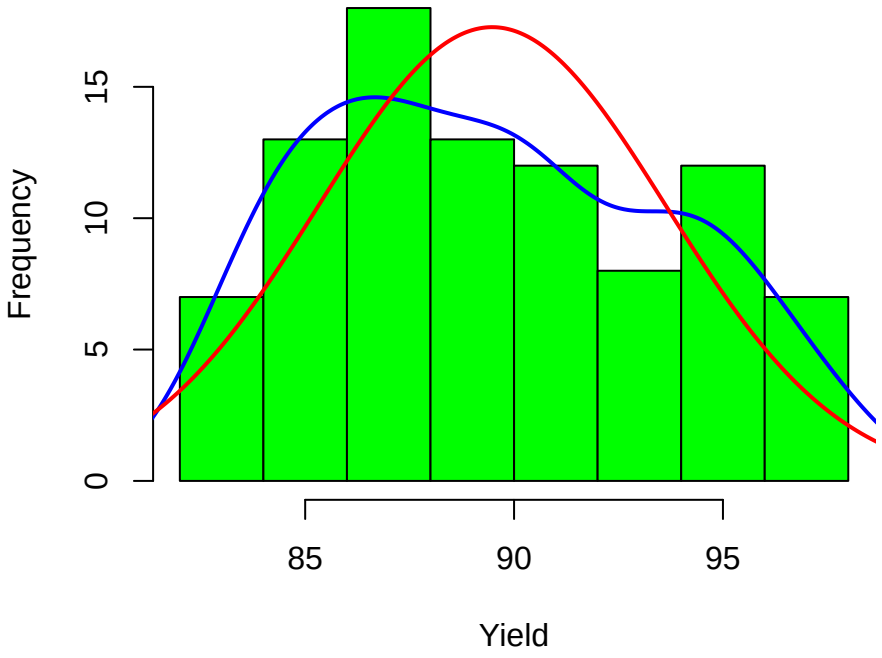


And a stem and leaf plot is below:

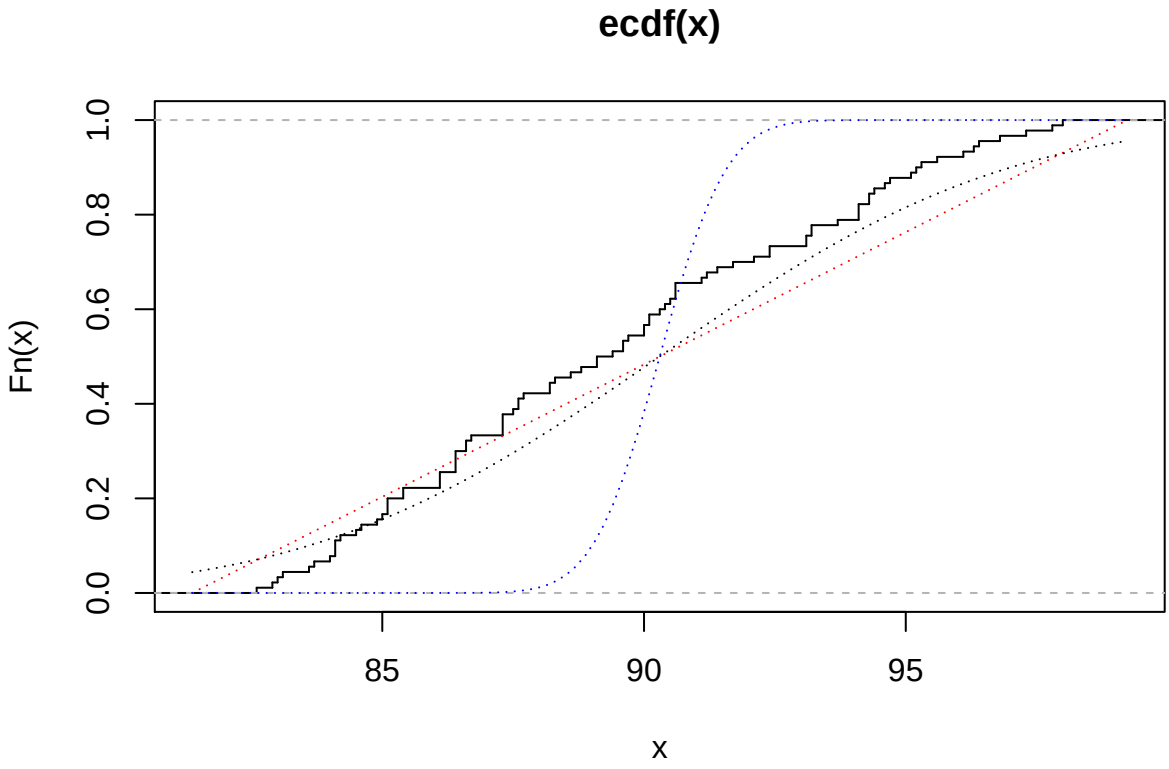
```
The decimal point is 1 digit(s) to the right of the |

11 | 89
12 | 0112334444
12 | 555556788999
13 | 011133
13 | 677
14 | 00122
14 |
15 | 1
15 |
16 | 0
```

3.7

Histogram is produced here:



Not sure which distribution this histogram might look like. It definitely doesn't look like a normal distribution (red curve). I've added a density curve (blue) to the plot as a reference. The best fit for our data may not be one which is covered in chapter 3. How about looking at an emperical distribution plot:

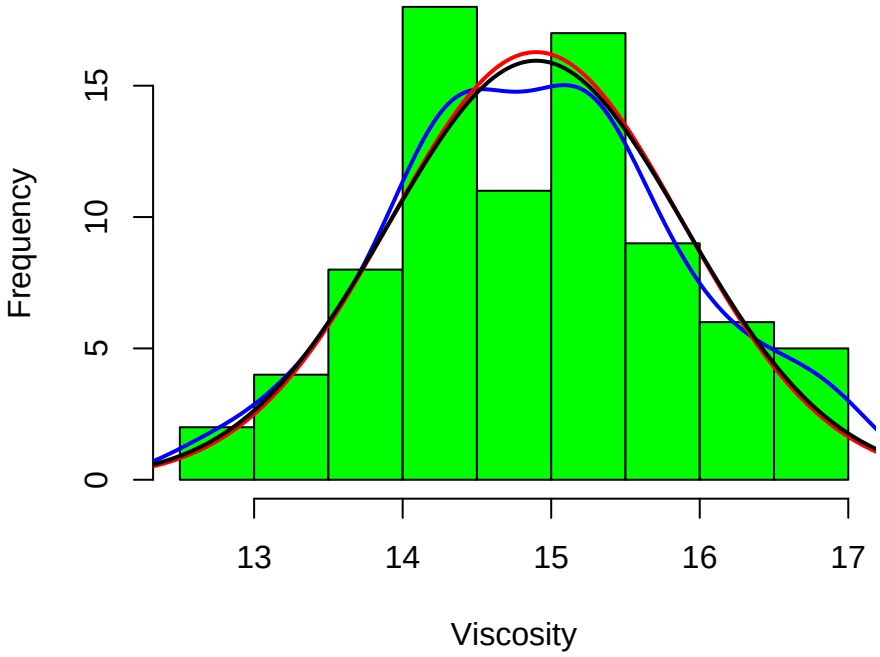


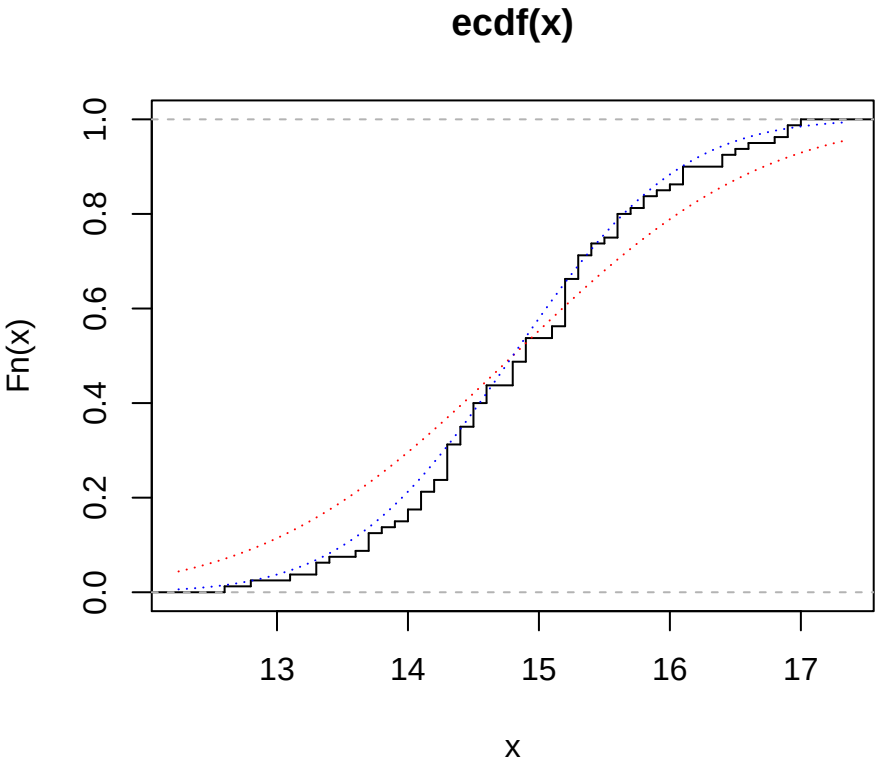
3.8

First, construct and display a stem and leaf plot:

```
The decimal point is at the |

12 | 68
13 | 1334
13 | 677789
14 | 0011122333333444
14 | 555566688889999
15 | 1122222222333344
15 | 566667889
16 | 011144
16 | 56899
17 | 0
```

And a plost of thei histogram with a fitted normal and density curve:





Interestingly, unlike the prior histogram, the normal and density curves appear to be very close (red) with the t distribution in black as well. Also, the blue line (t distribution) follows the cdf plot of the data very closely. Assuming the data follows the t distribution appears a safe call.

The above stem and leaf plot