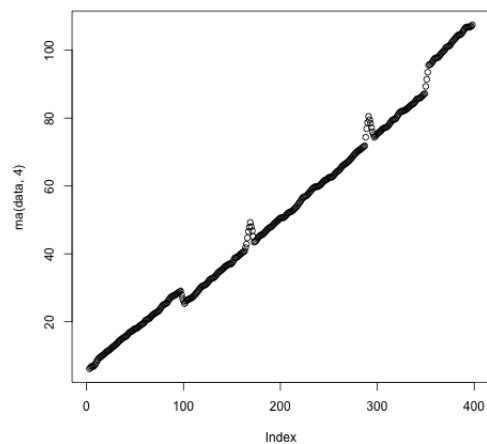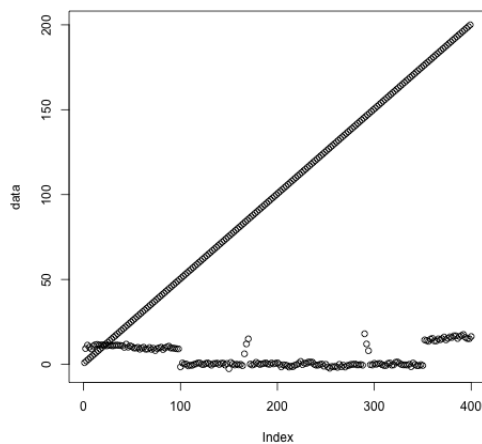1. Dr. Martin has emailed you the data set, hmwk1.txt, which gives the time evolution of a certain quantity of interest to him. Using R, plot the original data. In addition, using Rs ma() function, plot a smoothed version of the data. What attribute of the original data is hidden by referring only to the smoothed data?

```
#!/usr/bin/RScript
if(require("forecast")){
    data <- scan("hmwk1.txt")          #read in the file
    png("01data_plot.png")             #plot to specified png
    plot(data)                         #plot data
    dev.off()
    png("01data_smoothed.png")         #plot to specified png
    plot(ma(data,4))                   #plot smoothed data
    dev.off()
}
```

The output of the above code is

When the data is smoothed, the outlying points are lost.

2. Dr. Martin has emailed to you the data set, co2.txt. The data represents 16 years of collecting monthly CO_2 data on the island of Hawaii, with the first year of CO_2 starting in January of 1958. a) Using R, plot the data. b) Using Rs stl() command, plot the 1. trend, 2. seasonal, and 3. irregular components of the data.

```
#!/usr/bin/RScript
if(require("forecast")){
    data <- scan("co2.txt")
    png("02data_plot.png")
    plot(data)
    dev.off()
    series <- ts(data, start=c(2000,1), end=c(2016,13), frequency=13)
    png("02seasonal.png")
    seasonal <- stl(series, s.window="period")
    plot(seasonal)
    dev.off()
}
```
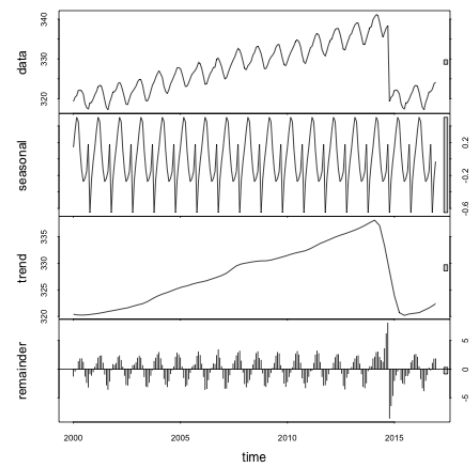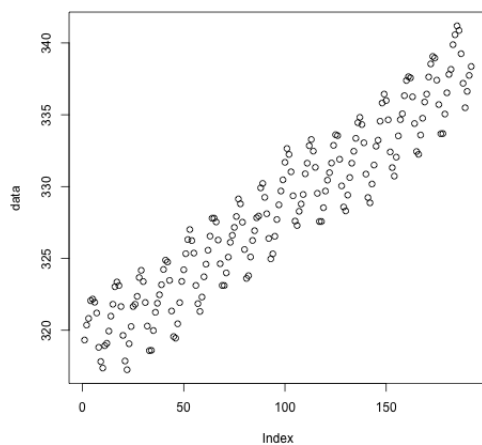
3. The following table gives the depth Z of water in feet for surface points with rectangular coordinates X, Y in meters. The depth of measurements were made at low tide. Your ship has a draft of 5 feet. What region should you avoid within the rectangle $[75, 200] \times [50, 150]$?

X	Y	Z
129.0	7.5	4
140.0	141.5	8
108.5	28.0	6
88.0	147.0	8
185.5	22.5	6
195.0	137.5	8
105.5	85.5	8
157.5	-6.5	9
107.5	-81.0	9
77.0	3.0	8
162.0	-66.5	9
162.0	84.0	4
117.5	-38.5	9

4. My full name is James Elder Martin - numerically this corresponds to the vector 10, 1, 13, 5, 19, 5, 12, 4, 5, 18, 13, 1, 18, 20, 9, 14. Type the numerical representation of your own full name into R as a single vector. Then issue the command, source("batch.R"), and then (instructions for next calling batch.R are detailed in the comments of the file, batch.R) produce a vector containing batch averages, using a batch size, that is, a k, of 3.

```
#!/usr/bin/RScript
source("batch.R")
lets <- c(19,20,5,22,5,14,1,12,1,14,18,15,19,5,14,4,1,8,12)
res <- batching(3,lets)
print(res)
# Produces
# [1] 14.666667 13.666667  4.666667 15.666667 12.666667  4.333333
```