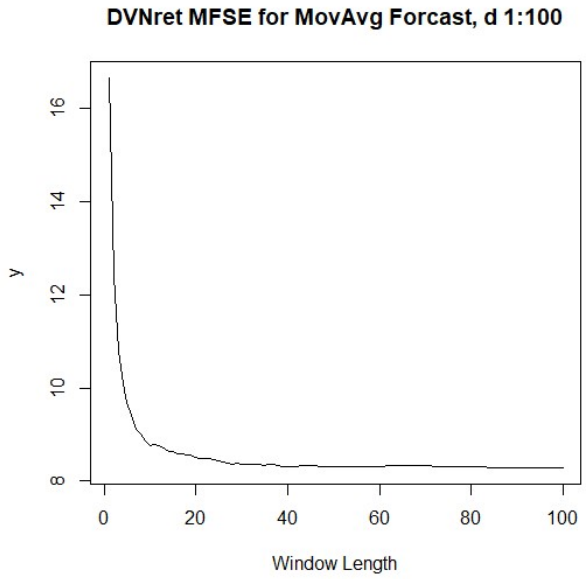
1. First question
    a. After loading the functions MSFE and VSFE along with my stock data. I plotted the first 100 MSFE values.

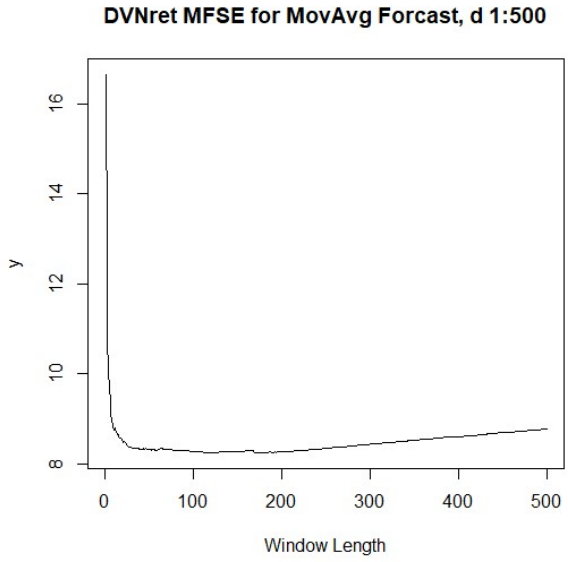
```
> plot(v[1:100],main="DVNret MFSE for MovAvg Forcast, d 1:100",xlab="Window Length",ylab="y",type="l")
```

which resulted in the following graph:



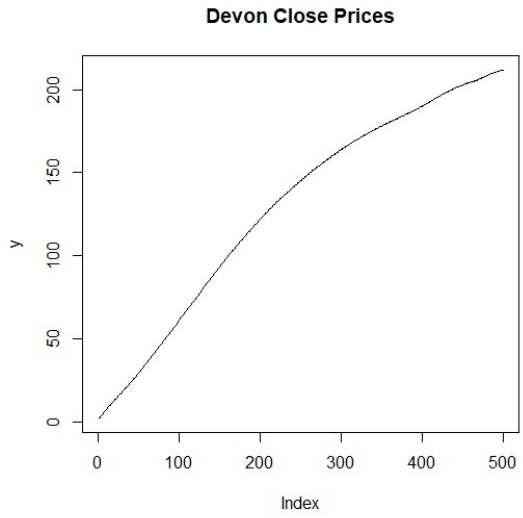
    b. The horizonal value would be the window length. It shows how many values are used for the moving average. The vertical values displays the MSFE of each.
    c. I recommend using a lower window length to keep the moving averages low. At the tail of the graph (80-100) the values began to be lower, showing a lower amount of error.
    d. When increasing the MSFE values to 500, I noticed how the moving averages toward the end tend to increase but IBMret declined and steadied around 450.

```
> plot(v[1:500],main="DVNret MFSE for MovAvg Forcast, d 1:500",xlab="Window Length",ylab="y",type="l")
```



e. I believe that the MSFE of a window length of 1 would be significantly larger than a window length of 10 because it has less values to make the average lower.

2. The MSFE averages for Denvon closing prices begin low and steadly increases as the window length increases. `> plot(y,main="Devon Close Prices",type="l")`



3. After plotting the daily range of DVN stock of varying lengths, I discovered that using a lower length makes the MSFE averages lower. Here, I began using a multiple length values (500,100,25) to observe the curves they produce.

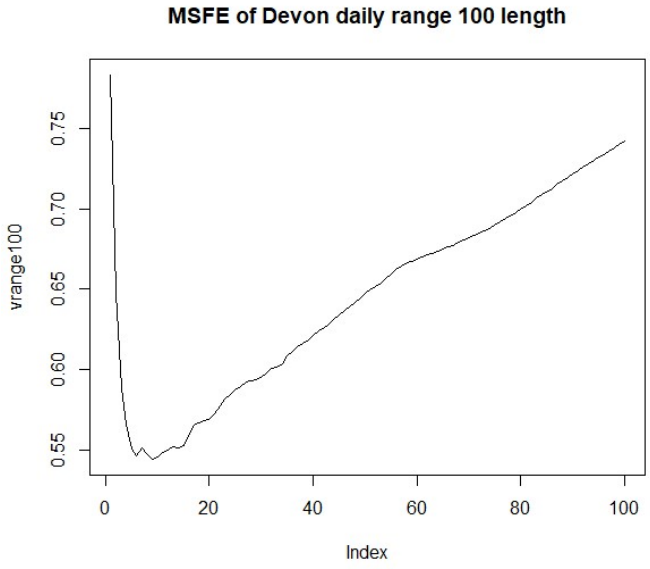
```
> vrange100 = VSFE(range,100)
> vrange500 = VSFE(range,500)
> vrange25 = VSFE(range,25)
```

Starting with 500, I seen that the curve increases dramatically

```
> plot(vrange500,main="MSFE of Devon daily range 500 length",type="l")
```

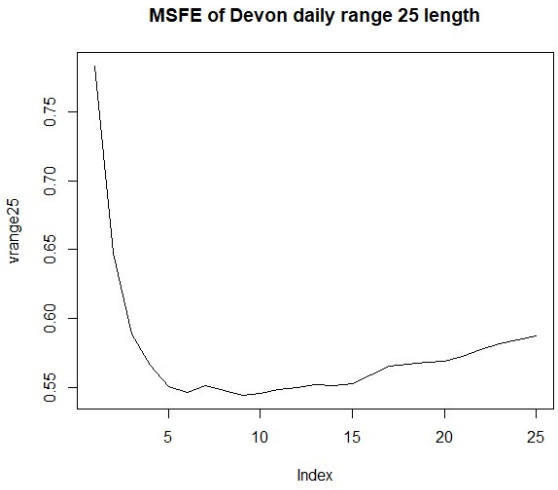
When lowering the length to 100, I noticed the increase of the MSFE was less than the 500.

```
> plot(vrange100,main="MSFE of Devon daily range 100 length",type="l")
```



Finally, when lowering the length to 25, I discovered the MSFE averages were dramatically lower than the previous examples.

```
> plot(vrange25,main="MSFE of Devon daily range 25 length",type="l")
```



As shown above, I believe a lower length results in lower MSFE averages. The reason why this is better because the lower MSFE average is more accurate than a higher one.

APPENDIX:

```
> history()
> dvn = read.csv("DVN.csv")
> dvn = dvn[-1, ]
> head(dvn,10)
> MVG1 =
+ function (x,m)
+ {
+ n <- length(x)
+ y <- vector(length=(n-m))
+
+ for(k in 1:(n-m)) {
+ y[k] <- ( x[m+k] - mean(x[k:(k+m-1) ]) )**2
+ }
+ msfe <- mean(y)
+ return(msfe)
+ }
> VSFE <-
+ function (x,d) # x is data, d is max window length
+ {
+ z <- vector(length=d)
+ for(j in 1:d) {
+
+ z[j] <- MVG1(x,j)
+
+ }
+ return(z)
+ }
> VSFE(dvn,500)
> v = VSFE(dvn$DVNret,500)
> plot(y[1:100])
> ls()
[1] "dvn"         "MVG1"        "rand.values" "v"           "VSFE"
[6] "x"           "y"
> rm(v)
> v = VSFE(dvn$DVNret,500)
> plot(y[1:100])
> plot(y[1:100],main="Devon Energy 1:100 MSFE values",xlab="Window Length",type="l")
> plot(y[1:500],main="Devon Energy 1:500 MSFE values",xlab="Window Length",type="l")
> plot(y,main="Devon Energy 1:500 MSFE values",xlab="Window Length",type="l")
> v = VSFE(DVNret,500)
Error in MVG1(x, j) : object 'DVNret' not found
> VSFE(DVNret,4)
Error in MVG1(x, j) : object 'DVNret' not found
> VSFE(dvn$DVNret,4)
[1] 16.65972 12.42466 10.78498 10.08427
> v = VSFE(dvn$DVNret,500)
```

```
> plot(v[1:100],main="DVNret MFSE for MovAvg Forcast, d 1:100",xlab="Window Length",ylab="y",type="l")
>
> min(v)
[1] 8.242798
> max(v)
[1] 16.65972
> plot(v[1:500],type="l")
> plot(v[1:500],main="DVNret MFSE for MovAvg Forcast, d 1:500",xlab="Window Length",ylab="y",type="l")
>
> y = VSFE(dvn$Close,500)
> plot(y)
> plot(y,type="l")
> plot(y,main="Devon Close Prices",type="l")
> range = (dvn$Low - dvn$High)
> range(10)
[1] 10 10
> vrange = VSFE(range,100)
> plot(vrange)
> plot(vrange,type="l")
> plot(vrange,main="MSFE of Devon daily range",type="l")
> plot(v[1:100],main="DVNret MFSE for MovAvg Forcast, d 1:100",xlab="Window Length",ylab="y",type="l")
> min(v)
[1] 8.242798
> v[1:5]
[1] 16.659725 12.424655 10.784977 10.084266  9.681426
> z = c(3.3,1.8,4.3,1.2,5.5)
> MVG1(z,1)
[1] 9.15
> plot(v[1:100])
> plot(v[1:500])
> plot(v[1:100])
> range = (dvn$Low - dvn$High)
> vrange = VSFE(range,100)
> plot(vrange,main="MSFE of Devon daily range",type="l")
> vrange100 = VSFE(range,100)
> vrange500 = VSFE(range,500)
> vrange25 = VSFE(range,25)
> plot(vrange500,main="MSFE of Devon daily range",type="l")
> plot(vrange500,main="MSFE of Devon daily range",type="l")
> plot(vrange100,main="MSFE of Devon daily range",type="l")
> plot(vrange25,main="MSFE of Devon daily range",type="l")
> plot(vrange25,main="MSFE of Devon daily range 25 length",type="l")
> plot(vrange500,main="MSFE of Devon daily range 500 length",type="l")
> plot(vrange100,main="MSFE of Devon daily range 100 length",type="l")
> plot(vrange25,main="MSFE of Devon daily range 25 length",type="l")
> history()
Error in file(con, "r") : cannot open the connection
In addition: Warning message:
In file(con, "r") :
  cannot open file 'C:\Users\whall\AppData\Local\Temp\RtmpU5z34k\Rrawhist51a8326e2c6d': No such file or directory
```