### ---problem 4--- ###

tbl\_funds = read.csv('funds-1584g-mon.csv')

tbl\_factors = read.csv('Fama\_French\_Three\_Factors\_Monthly.CSV')

tbl\_mkt = data.frame(cbind(tbl\_factors[1], tbl\_factors[2] + tbl\_factors[5])) / 100

names(tbl\_mkt) = c('Date','Mkt')

tbl\_funds[1] = tbl\_mkt[1]

# # (a)

funds\_mean0 = colMeans(tbl\_funds[tbl\_funds$Date < 2014.01,2:ncol(tbl\_funds)])

mkt\_mean0 = mean(tbl\_mkt[tbl\_mkt$Date < 2014.01, 2:ncol(tbl\_mkt)])

funds\_mean\_annual = funds\_mean0\*12

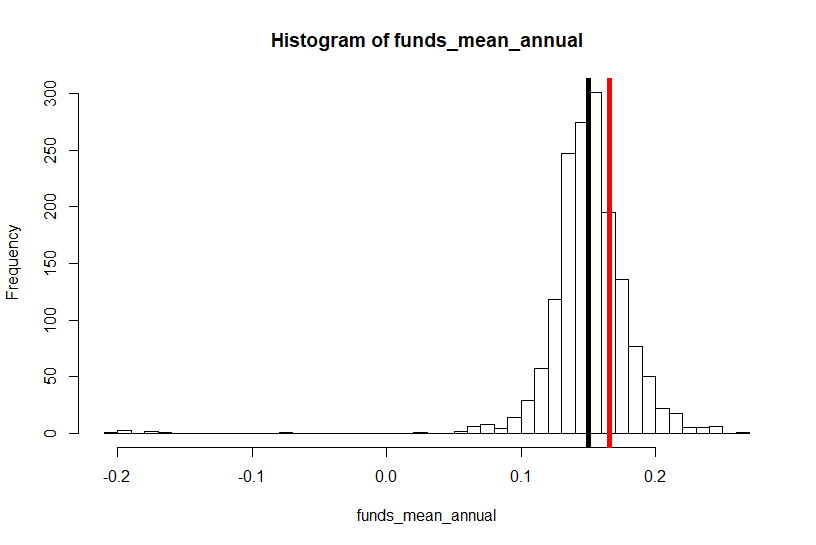
mkt\_mean\_annual = mkt\_mean0\*12

hist(funds\_mean\_annual, nclass=40)

abline(v=mean(funds\_mean\_annual), col="black")

abline(v=mkt\_mean\_annual, col="red")

percentage = sum(funds\_mean\_annual - mkt\_mean\_annual > 0) / length(funds\_mean\_annual)



***Figure 1***

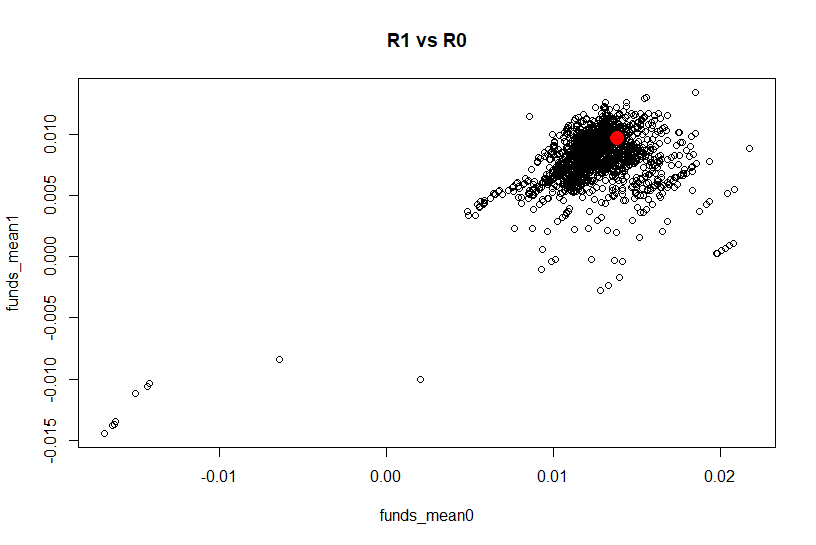
## # (b)

funds\_mean1 = colMeans(tbl\_funds[tbl\_funds$Date >= 2014.01,2:ncol(tbl\_funds)])

mkt\_mean1 = mean(tbl\_mkt[tbl\_mkt$Date >= 2014.01, 2:ncol(tbl\_mkt)])

plot(funds\_mean0, funds\_mean1, main='R1 vs R0')

points(mkt\_mean0, mkt\_mean1, col='red', pch=16, cex=2)



***Figure 2***

quantile0 = quantile(funds\_mean0, c(.2, .8))

L0 = funds\_mean0[funds\_mean0 <= quantile0[1]]

M0 = funds\_mean0[funds\_mean0 > quantile0[1] & funds\_mean0 < quantile0[2]]

W0 = funds\_mean0[funds\_mean0 >= quantile0[2]]

quantile1 = quantile(funds\_mean1, c(.2, .8))

L1 = funds\_mean1[funds\_mean1 <= quantile1[1]]

M1 = funds\_mean1[funds\_mean1 > quantile1[1] & funds\_mean1 < quantile1[2]]

W1 = funds\_mean1[funds\_mean1 >= quantile1[2]]

tbl\_1a = matrix(0,

nrow=3, ncol=3, dimnames=list(c("L0","M0","W0"), c("L1","M1","W1")))

tbl\_1a[1] = length(intersect(names(L0),names(L1)))

tbl\_1a[2] = length(intersect(names(M0),names(L1)))

tbl\_1a[3] = length(intersect(names(W0),names(L1)))

tbl\_1a[4] = length(intersect(names(L0),names(M1)))

tbl\_1a[5] = length(intersect(names(M0),names(M1)))

tbl\_1a[6] = length(intersect(names(W0),names(M1)))

tbl\_1a[7] = length(intersect(names(L0),names(W1)))

tbl\_1a[8] = length(intersect(names(M0),names(W1)))

tbl\_1a[9] = length(intersect(names(W0),names(W1)))

tbl\_1b = round(tbl\_1a / sum(tbl\_1a),2)

tbl\_1c = matrix(0,

nrow=3, ncol=3, dimnames=list(c("L0","M0","W0"), c("L1","M1","W1")))

tbl\_1c[1,] = tbl\_1a[1,] / sum(tbl\_1a[1,])

tbl\_1c[2,] = tbl\_1a[2,] / sum(tbl\_1a[2,])

tbl\_1c[3,] = tbl\_1a[3,] / sum(tbl\_1a[3,])

tbl\_1c = round(tbl\_1c, 2)

tbl\_1d = rbind(c(0.2, 0.6, 0.2),c(0.2, 0.6, 0.2),c(0.2, 0.6, 0.2))

colnames(tbl\_1d) = c("L1","M1","W1")

rownames(tbl\_1d) = c("L0","M0","W0")

Table 1A

|  |  |  |  |
| --- | --- | --- | --- |
|  | L1 | M1 | W1 |
| L0 | 158 | 144 | 15 |
| M0 | 87 | 632 | 231 |
| W0 | 72 | 174 | 71 |

Table 1B

|  |  |  |  |
| --- | --- | --- | --- |
|  | L1 | M1 | W1 |
| L0 | 0.10 | 0.09 | 0.01 |
| M0 | 0.05 | 0.40 | 0.15 |
| W0 | 0.05 | 0.11 | 0.04 |

Table 1C

|  |  |  |  |
| --- | --- | --- | --- |
|  | L1 | M1 | W1 |
| L0 | 0.50 | 0.45 | 0.05 |
| M0 | 0.09 | 0.67 | 0.24 |
| W0 | 0.23 | 0.55 | 0.22 |

Table 1D

|  |  |  |  |
| --- | --- | --- | --- |
|  | L1 | M1 | W1 |
| L0 | 0.20 | 0.60 | 0.20 |
| M0 | 0.20 | 0.60 | 0.20 |
| W0 | 0.20 | 0.60 | 0.20 |

## # (c)

L0 = funds\_mean0[funds\_mean0 <= mkt\_mean0]

W0 = funds\_mean0[funds\_mean0 > mkt\_mean0]

L1 = funds\_mean0[funds\_mean1 <= mkt\_mean1]

W1 = funds\_mean0[funds\_mean1 > mkt\_mean1]

tbl\_2a = matrix(0,

nrow=2, ncol=2, dimnames=list(c("L0","W0"), c("L1","W1")))

tbl\_2a[1] = length(intersect(names(L0),names(L1)))

tbl\_2a[2] = length(intersect(names(W0),names(L1)))

tbl\_2a[3] = length(intersect(names(L0),names(W1)))

tbl\_2a[4] = length(intersect(names(W0),names(W1)))

tbl\_2b = round(tbl\_2a / sum(tbl\_2a),2)

tbl\_2c = matrix(0,

nrow=2, ncol=2, dimnames=list(c("L0","W0"), c("L1","W1")))

tbl\_2c[1,] = tbl\_2a[1,] / sum(tbl\_2a[1,])

tbl\_2c[2,] = tbl\_2a[2,] / sum(tbl\_2a[2,])

tbl\_2c = round(tbl\_2c, 2)

pL1 = round(sum(funds\_mean1 <= mkt\_mean1)/length(funds\_mean1),2)

pW1 = round(sum(funds\_mean1 > mkt\_mean1)/length(funds\_mean1),2)

tbl\_2d = rbind(c(pL1,pW1),c(pL1,pW1))

colnames(tbl\_2d) = c("L1","W1")

rownames(tbl\_2d) = c("L0","W0")

Table 2A

|  |  |  |
| --- | --- | --- |
|  | L1 | W1 |
| L0 | 945 | 246 |
| W0 | 295 | 98 |

Table 2B

|  |  |  |
| --- | --- | --- |
|  | L1 | W1 |
| L0 | 0.60 | 0.16 |
| W0 | 0.19 | 0.06 |

Table 2C

|  |  |  |
| --- | --- | --- |
|  | L1 | W1 |
| L0 | 0.79 | 0.21 |
| W0 | 0.75 | 0.25 |

Table 2D

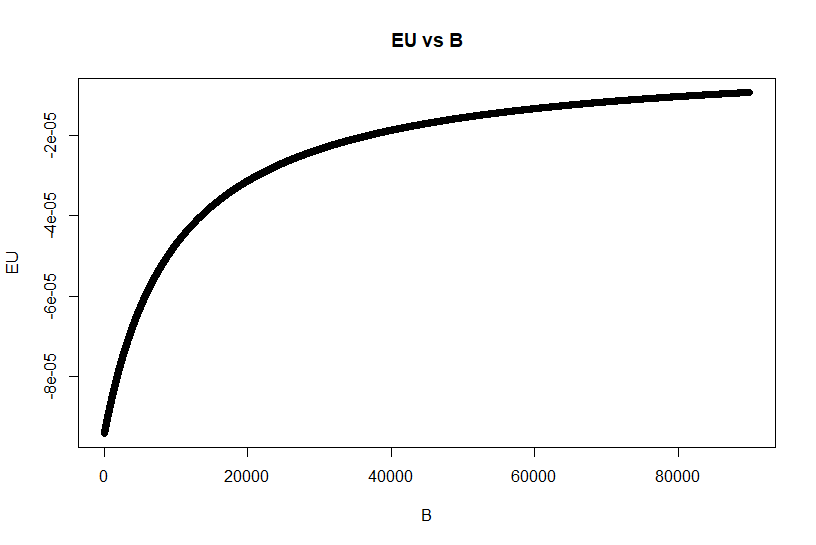
|  |  |  |
| --- | --- | --- |
|  | L1 | W1 |
| L0 | 0.78 | 0.22 |
| W0 | 0.78 | 0.22 |

### ---problem 5--- ###

B = seq(0,90000,1)

EU = 0.5\*(-1/((10000+B)\*1.3)) + 0.5\*(-1/((10000+B)\*0.9))

plot(B, EU, main='EU vs B')

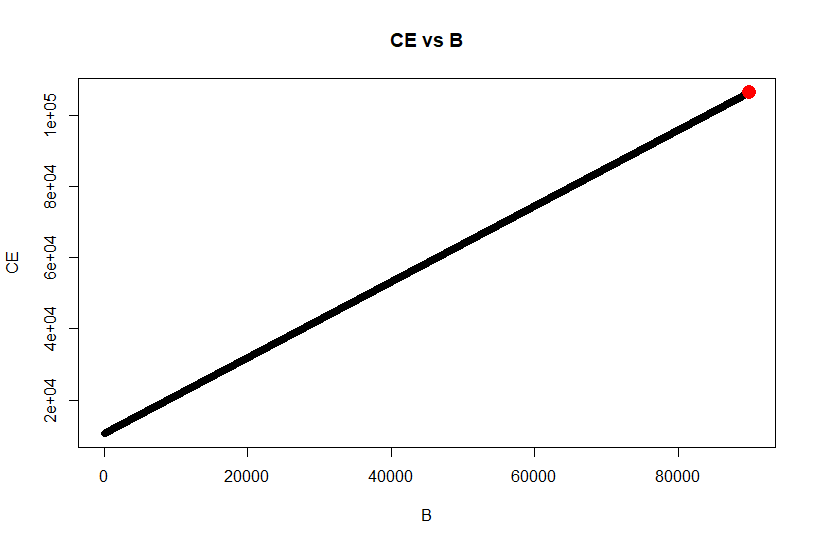


***Figure 3***

CE = 117\*(10000+B)/110

plot(B, CE, main='CE vs B')

points(B[which(CE==max(CE))], CE[which(CE==max(CE))],col='red',pch=16, cex=2)

******

***Figure 4***