```
> # First we load the package “haven” which enable R to read SAS file
> library(haven)
>
>
> # read the data and subtract those columns we need
> data<-read_sas("stkdata.sas7bdat")
> files<-read_sas("mktdata.sas7bdat")
> MKTRF<-HW_files["MKTRF"]
> RF<-files["RF"]
> UBS<-data[c(5641:5760),3]
> AXP<-data[c(601:720),3]
> GE<-data[c(2041:2160),3]
>
>
> # the data of UBS in Nov. 2014 is missing, we found the actual data (3.50
9%) and fill the missing value
> # we subtract MKTRF and RF from the file, but it is a “list” type of data
 in R, and it’s unable to directly be used to compute standard deviation i
n R, therefore we need to transform it using the “unlist()” function in R.
>
> UBS<-replace(UBS,83,0.03509)
> MKTRF<-unlist(MKTRF)
> RF<-unlist(RF)
>
>


> own_summary(UBS)
     Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
-0.2731000 -0.0587700 -0.0031590 0.0009131 0.0669900 0.4464000
[1] "STD:"
[1] 0.1122173
[1] "obervation:"
[1] 120
```

```
> own_summary(AXP)
    Min.  1st Qu.   Median    Mean 3rd Qu.    Max.
-0.27910 -0.02483 0.01022 0.01216 0.05031 0.86350
[1] "STD:"
[1] 0.112239
[1] "obervation:"
[1] 120
> own_summary(GE)
     Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
-0.2729000 -0.0465700 -0.0040130 0.0005073 0.0483100 0.2512000
[1] "STD:"
[1] 0.085445
[1] "obervation:"
[1] 120
> own_summary(MKTRF)
    Min.  1st Qu.    Median     Mean  3rd Qu.     Max.
-0.172300 -0.013350 0.012350 0.007869 0.034230 0.113500
[1] "STD:"
[1] 0.04472619
[1] "obervation:"
[1] 120
> own_summary(RF)
   Min. 1st Qu. Median   Mean 3rd Qu.    Max.
0.00000 0.00000 0.00010 0.00024 0.00020 0.00210
[1] "STD:"
[1] 0.0004569537
[1] "obervation:"
[1] 120
>
>
>
> # run CAPM regression using the lm() funcntion in R
>
> y1<-UBS-RF
> y2<-AXP-RF
> y3<-GE-RF
> x<-MKTRF-RF
> capm_ubs<-lm(y1~x)
> capm_axp<-lm(y2~x)
> capm_ge<-lm(y3~x)
> summary(capm_ubs)
```

```
Call:
lm(formula = y1 ~ x)

Residuals:
     Min       1Q   Median       3Q      Max
-0.265311 -0.049388 -0.004117 0.057472 0.298050

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.011287   0.008146 -1.385    0.169
x            1.567623   0.179884   8.715 2.14e-14 ***
---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.08796 on 118 degrees of freedom
Multiple R-squared: 0.3916,    Adjusted R-squared: 0.3864
F-statistic: 75.94 on 1 and 118 DF, p-value: 2.144e-14

> summary(capm_axp)

Call:
lm(formula = y2 ~ x)

Residuals:
    Min      1Q  Median      3Q     Max
-0.23207 -0.02992 -0.00545 0.02800 0.69778

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.0005387 0.0079208 -0.068    0.946
x            1.6325751 0.1749012   9.334 7.55e-16 ***
---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.08553 on 118 degrees of freedom
Multiple R-squared: 0.4248,    Adjusted R-squared: 0.4199
F-statistic: 87.13 on 1 and 118 DF, p-value: 7.546e-16

> summary(capm_ge)

Call:
lm(formula = y3 ~ x)
```

```
Residuals:
     Min       1Q   Median       3Q      Max
-0.187183 -0.031609 -0.001655  0.030420  0.141342

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.010524   0.005341   -1.97   0.0511 .
x            1.414527   0.117941   11.99   <2e-16 ***
---
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.05767 on 118 degrees of freedom
Multiple R-squared: 0.5494,     Adjusted R-squared: 0.5455
F-statistic: 143.8 on 1 and 118 DF, p-value: < 2.2e-16
```

```
> # Test statistics of Beta > 1
> #UBS
> (1.567623-1)/0.179884
[1] 3.155495
> #AXP
> (1.6325751-1)/0.1749012
[1] 3.616757
> #GE
> (1.414527-1)/0.117941
[1] 3.514698
```

```
> # predicted premium of each firms under 5/-5% market premium
> # UBS
> c(-0.011287+1.567623*0.05, -0.011287+(1.567623*-0.05))
[1]  0.06709415 -0.08966815
> # AXP
> c(-0.0005387+1.6325751*0.05, -0.0005387+(1.6325751*-0.05))
[1]  0.08109005 -0.08216746
> # GE
> c(-0.010524+1.414527*0.05, -0.010524+(1.414527*-0.05))
[1]  0.06020235 -0.08125035
```

```
> # Residual standard error of three CAPM regression model above:
> # UBS: 0.08796   AXP: 0.08553   GE: 0.05767
> # Critical t value under the condition of two-tail, alpha=5%, degree of freedom about 120: 1.98   (we can't find a table that contain the t value of 118 degree of freedom, so we just make do with the value under degree of freedom=120)
> # 95% confidence interval: predicted premium value +/- critical t value *residual standard error (forecast error)
>
> # UBS; 5% market premium
> c(0.06709415+1.98*0.08796, 0.06709415-1.98*0.08796)
[1]  0.2412550 -0.1070666
> # UBS; -5% market premium
> c(-0.08966815+1.98*0.08796, -0.08966815-1.98*0.08796)
[1]  0.08449265 -0.26382895
>
> # AXP; 5% market premium
> c(0.08109005+1.98*0.08553, 0.08109005-1.98*0.08553)
[1]  0.25043945 -0.08825935
> # AXP; -5% market premium
> c(-0.08216746+1.98*0.08553, -0.08216746-1.98*0.08553)
[1]  0.08718194 -0.25151686
>
> # GE; 5% market premium
> c(0.06020235+1.98*0.05767, 0.06020235-1.98*0.05767)
[1]  0.17438895 -0.05398425
> # GE; -5% market premium
> c(-0.08125035+1.98*0.05767, -0.08125035-1.98*0.05767)
[1]  0.03293625 -0.19543695
```