```
# Blatt 5, Aufgabe 2

data = read.table("C:/Users/Bjoern/Desktop/Eigene Dateien/Lehre/2015 SS/Oekonometrie/Blatt 5/gpa.txt", header=TRUE, sep="/")


#a)
data_f = subset(data, fem==1)
data_m = subset(data, fem==0)
n_f = length(data_f$gpa)
n_m = length(data_m$gpa)

X_f = matrix(1,n_f, 4)
X_f[,2] = data_f$sat
X_f[,3] = data_f$quant
X_f[,4] = data_f$hours
Y_f = data_f$gpa

X_m = matrix(1,n_m, 4)
X_m[,2] = data_m$sat
X_m[,3] = data_m$quant
X_m[,4] = data_m$hours
Y_m = data_m$gpa

beta_f = solve(t(X_f)%*%X_f)%*%t(X_f)%*%Y_f
beta_m = solve(t(X_m)%*%X_m)%*%t(X_m)%*%Y_m

print(beta_f)
print(beta_m)

R_m = diag(4)
c_m = beta_f
u_m = Y_m-X_m%*%beta_m
s2_m = sum(u_m^2)/(n_m-4)
f_m = t(R_m%*%beta_m-c_m)%*%solve(R_m%*%solve(t(X_m)%*%X_m)%*%t(R_m))%*%(R_m%*%beta_m-c_m)/(s2_m*4)
print(f_m)
if(f_m > qf(0.99, 4, n_m-4)){
  print("H0 wird verworfen")
}else{
  print("H0 wird nicht verworfen")
}

#b)

Y = data$gpa
n = length(data$gpa)
X = matrix(1,n,8)
X[,2] = data$fem
X[,3] = data$sat
X[,4] = data$fem*data$sat
X[,5] = data$quant
X[,6] = data$fem*data$quant
X[,7] = data$hours
X[,8] = data$fem*data$hours
```

```
beta = solve(t(X)%*%X)%*%t(X)%*%Y
u = Y-X%*%beta
s2 = sum(u^2)/(n-8)
R = matrix(0,4,8)
R[1,2] = 1
R[2,4] = 1
R[3,6] = 1
R[4,8] = 1
f = t(R%*%beta)%*%solve(R%*%solve(t(X)%*%X)%*%t(R))%*%(R%*%beta)/(s2*4)
print(f)
if(f > qf(0.95, 4, n-8)){
  print("H0 wird verworfen")
}else{
  print("H0 wird nicht verworfen")
}



#c)

SSR_m = sum(u_m^2)
u_f = Y_f-X_f%*%beta_f
SSR_f = sum(u_f^2)

X_t = matrix(1,n, 4)
X_t[,2] = data$sat
X_t[,3] = data$quant
X_t[,4] = data$hours
Y_t = data$gpa

beta_t = solve(t(X_t)%*%X_t)%*%t(X_t)%*%Y_t
u_t = Y_t-X_t%*%beta_t
SSR_t = sum(u_t^2)

chow = (SSR_t - (SSR_f+SSR_m))*(n-2*4)/((SSR_f+SSR_m)*4)
print(chow)

#d)
print(beta)



#Ausgabe
              [,1]
[1,]  0.100346426
[2,]  0.001728053
[3,] -0.005916691
[4,]  0.015860326
               [,1]
[1,]  1.2139843909
[2,]  0.0006113122
[3,] -0.0059674507
[4,]  0.0103004353
        [,1]
[1,] 15.9564
[1] "H0 wird verworfen"
         [,1]
[1,] 4.422703
[1] "H0 wird verworfen"
```

```
[1] 4.422703
              [,1]
[1,]  1.213984e+00
[2,] -1.113638e+00
[3,]  6.113122e-04
[4,]  1.116741e-03
[5,] -5.967451e-03
[6,]  5.075969e-05
[7,]  1.030044e-02
[8,]  5.559891e-03



#Blatt 5, Aufgabe 3

#c)
library(gap)
data = read.table("C:/Users/Bjoern/Desktop/Eigene Dateien/Lehre/2015 SS/Oekonometrie/Blatt
5/geburten.txt", header=TRUE, sep=";")
data1 = subset(data, black==1)
data2 = subset(data, black==0)

n1 = length(data1$kids)
n2 = length(data2$kids)

y1 = data1$kids
y2 = data2$kids

x1 = matrix(0,n1, 16)
x1[,1] = data1$educ
x1[,2] = data1$age
x1[,3] = data1$age^2
x1[,4] = data1$east
x1[,5] = data1$northcen
x1[,6] = data1$west
x1[,7] = data1$farm
x1[,8] = data1$othrural
x1[,9] = data1$town
x1[,10] = data1$smcity
x1[,11] = data1$y74
x1[,12] = data1$y76
x1[,13] = data1$y78
x1[,14] = data1$y80
x1[,15] = data1$y82
x1[,16] = data1$y84

x2 = matrix(0,n2, 16)
x2[,1] = data2$educ
x2[,2] = data2$age
x2[,3] = data2$age^2
x2[,4] = data2$east
x2[,5] = data2$northcen
x2[,6] = data2$west
x2[,7] = data2$farm
x2[,8] = data2$othrural
x2[,9] = data2$town
x2[,10] = data2$smcity
```

```
x2[,11] = data2$y74
x2[,12] = data2$y76
x2[,13] = data2$y78
x2[,14] = data2$y80
x2[,15] = data2$y82
x2[,16] = data2$y84

print(chow.test(y1, x1, y2, x2))

#Ausgabe
     F value        d.f.1        d.f.2      P value
3.774005e+00 1.700000e+01 1.095000e+03 3.637427e-07



#Blatt 5, Aufgabe 4

#d)

y = log(c(2,6,1,9,4,10,0.6,1.4,3,2,2,1))
x1 = c(1,1,1,1,1,1,0,0,0,0,0,0)
x2 = c(0,0,0,1,1,1,0,0,0,1,1,1)

print(summary(lm(y~1+x1+x2+I(x1*x2))))


#Ausgabe
Call:
lm(formula = y ~ 1 + x1 + x2 + I(x1 * x2))

Residuals:
    Min      1Q  Median      3Q     Max
-0.8283 -0.4905  0.1297  0.2615  0.9635

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   0.3081     0.3954   0.779    0.458
x1            0.5202     0.5592   0.930    0.379
x2            0.1540     0.5592   0.275    0.790
I(x1 * x2)    0.9797     0.7908   1.239    0.250

Residual standard error: 0.6848 on 8 degrees of freedom
Multiple R-squared: 0.5725, Adjusted R-squared: 0.4122
F-statistic: 3.571 on 3 and 8 DF,  p-value: 0.06659

#p-Wert = 0.25 --> keine statistische Signifikanz erkennbar
```