```
data=read.csv("ex5-1.csv",header=F)

# 분산분석

head(data)
y=data[,1]
A=data[,2]
B=data[,3]
A=as.factor(A)
B=as.factor(B)
aov2=aov(y~A+B+A:B)
summary(aov2)

aov2=aov(y~A*B)
summary(aov2)

#> summary(aov2)
#Df Sum Sq Mean Sq F value   Pr(>F)
#  A            3  542.1   180.7   8.521  0.00266 **
#  B            2 2425.6  1212.8  57.185 7.33e-07 ***
#  A:B          6    9.7     1.6   0.077  0.99755
#Residuals   12  254.5    21.2
#---
#  Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1


# 회귀분석

reg.out=lm(y~A*B)
summary(reg.out)


#> reg.out=lm(y~A*B)
#> summary(reg.out)

# Coefficients:
#   Estimate Std. Error t value Pr(>|t|)
#  (Intercept)  9.050e+01  3.256e+00  27.791 2.91e-12 ***
#  A2           7.500e+00  4.605e+00   1.629 0.129355
#  A3           1.250e+01  4.605e+00   2.714 0.018805 *
#  A4           4.000e+00  4.605e+00   0.869 0.402118
#  B2           1.300e+01  4.605e+00   2.823 0.015378 *
#  B3           2.300e+01  4.605e+00   4.994 0.000312 ***
#  A2:B2        2.542e-14  6.513e+00   0.000 1.000000
# A3:B2       -1.500e+00  6.513e+00  -0.230 0.821726
# A4:B2       -1.500e+00  6.513e+00  -0.230 0.821726
# A2:B3        3.000e+00  6.513e+00   0.461 0.653299
# A3:B3        2.000e+00  6.513e+00   0.307 0.764041
# A4:B3        1.500e+00  6.513e+00   0.230 0.821726
# ---
#  Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

# Residual standard error: 4.605 on 12 degrees of freedom
```

```
# Multiple R-squared:  0.9213,  Adjusted R-squared:  0.8491
# F-statistic: 12.76 on 11 and 12 DF,  p-value: 5.501e-05


aov2.reg=aov(reg.out)
summary(aov2.reg)

#> summary(aov2.reg)
# Df Sum Sq Mean Sq F value   Pr(>F)
# A            3  542.1   180.7   8.521  0.00266 **
# B            2 2425.6  1212.8  57.185 7.33e-07 ***
# A:B          6    9.7     1.6   0.077  0.99755
# Residuals   12  254.5    21.2
# ---
#  Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
# >

summary(aov2)


# design matrix를 직접 입력

a2=(data[,2]==2)
a3=(data[,2]==3)
a4=(data[,2]==4)
b2=(data[,3]==2)
b3=(data[,3]==3)
xdesign=cbind(a2,a3,a4,b2,b3,a2*b2,a3*b2,a4*b2,a2*b3,a3*b3,a4*b3)
head(xdesign)

# a2 a3 a4 b2 b3
# [1,]  0  0  0  0  0 0 0 0 0 0 0
# [2,]  0  0  0  0  0 0 0 0 0 0 0
# [3,]  0  0  0  1  0 0 0 0 0 0 0
# [4,]  0  0  0  1  0 0 0 0 0 0 0
# [5,]  0  0  0  0  1 0 0 0 0 0 0
# [6,]  0  0  0  0  1 0 0 0 0 0 0
# >


reg.out=lm(y~xdesign)
summary(reg.out)

# Coefficients:
# Estimate Std. Error t value Pr(>|t|)
# (Intercept)  9.050e+01  3.256e+00  27.791 2.91e-12 ***
# xdesigna2    7.500e+00  4.605e+00   1.629 0.129355
# xdesigna3    1.250e+01  4.605e+00   2.714 0.018805 *
# xdesigna4    4.000e+00  4.605e+00   0.869 0.402118
# xdesignb2    1.300e+01  4.605e+00   2.823 0.015378 *
# xdesignb3    2.300e+01  4.605e+00   4.994 0.000312 ***
# xdesign      2.542e-14  6.513e+00   0.000 1.000000
# xdesign     -1.500e+00  6.513e+00  -0.230 0.821726
# xdesign     -1.500e+00  6.513e+00  -0.230 0.821726
```

```
# xdesign      3.000e+00  6.513e+00   0.461 0.653299
# xdesign      2.000e+00  6.513e+00   0.307 0.764041
# xdesign      1.500e+00  6.513e+00   0.230 0.821726
# ---
# Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

# Residual standard error: 4.605 on 12 degrees of freedom
# Multiple R-squared:  0.9213,  Adjusted R-squared:  0.8491
# F-statistic: 12.76 on 11 and 12 DF,  p-value: 5.501e-05

aov2.reg=aov(reg.out)
summary(aov2.reg)

# > aov2.reg=aov(reg.out)
#> summary(aov2.reg)
#Df Sum Sq Mean Sq F value  Pr(>F)
#xdesign     11 2977.5  270.68   12.76 5.5e-05 ***
#Residuals   12  254.5   21.21
#---
#  Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
#
```