MATH 8050

#Author : Pallavi Karan

#Date: 10/10/2016

#Purpose: Assignmnet no 4

rm(list = ls()) #Clear the lists

my\_data <- read.table("D://MATH-DA//PatientSatisfaction.txt", sep = "", header = TRUE)

attach(my\_data)

View(my\_data)

head(my\_data)

#library(scatterplot3d)

#library(rgl)

pairs(my\_data) #ANS" 3a Scatterplot

cor(my\_data) #ANS: 3a corelation

######################################## 3b ######################################################

mod1= lm(my\_data$Satis~my\_data$Age+my\_data$Severity+my\_data$Anxiety) #Automatic model fitting

summary(mod1)

anova(mod1)

#Manual:

# Calculate the matrices manually

(X= cbind(rep(1,dim(my\_data)[1]), my\_data[,2:4])) # cbind = "column-wise bind"

(Y= my\_data[,1])

t(X)%\*%as.matrix(X)

t(X)%\*%Y

solve(t(X)%\*%as.matrix(X))

(beta.hat= solve(t(X)%\*%as.matrix(X))%\*%t(X)%\*%Y)

# Plot the estimated response plane

Y<-my\_data[,1]

x1<-my\_data[,2]

x2<-my\_data[,3]

x3<-my\_data[,4]

x1s= min(x1); x1m= max(x1)

x2s= min(x2); x2m= max(x2)

x3s= min(x3); x3m= max(x3)

# expand.grid - creates all combinations of the arguments

grid= expand.grid(seq(from=min(x1),to=max(x1),length.out=100),

seq(from=min(x2),to=max(x2),length.out=100),

seq(from=min(x3),to=max(x3),length.out=100))

z= beta.hat[1]+ beta.hat[2]\*grid[,1] + beta.hat[3]\*grid[,2] + beta.hat[4]\*grid[,3]

############################################# 3c ##############################################

# Manual ANOVA

n= length(Y)

p= 4

J= matrix(1,nrow= n, ncol= n)

H= as.matrix(X)%\*%solve(t(X)%\*%as.matrix(X))%\*%t(X)

I= diag(rep(1,n))

(SST= t(Y)%\*%(I-(1/n)\*J)%\*%Y)

(SSE= t(Y)%\*%(I-H)%\*%Y)

(SSR= t(Y)%\*%(H-(1/n)\*J)%\*%Y)

# F test

alpha= .10

(F.stat= (SSR/(p-1))/(SSE/(n-p))) #test stat

qf(1-alpha,p-1,n-p) # Critical value for the above test

pval = 2 ∗ pt(F.stat, df=n−4)

pval

# Multiple and adjusted Rsquared

(R.sq= SSR/SST)

(R.sq.adj= 1-((SSE/(n-p))/(SST/(n-1)) ) )

# Fit the model "automatically"

mod1= lm(Y~x1+x2+x3)

summary(mod1)

anova(mod1)

# Notice that the ANOVA table finds the SS associated

# with each predictor separtely. Their sum is the

# regression SS.

################################## 3d ########################################

# Find C.I.'s about beta1 and beta2

s2beta= as.vector(SSE/(n-p))\*(solve(t(X)%\*%as.matrix(X)))

se.beta1= sqrt(s2beta[2,2])

se.beta2= sqrt(s2beta[3,3])

alpha=0.1

print( c(beta.hat[2]-qt(1-alpha/4,n-p)\*se.beta1,beta.hat[2]+qt(1-alpha/4,n-p)\*se.beta1 ))

print( c(beta.hat[3]-qt(1-alpha/4,n-p)\*se.beta2,beta.hat[3]+qt(1-alpha/4,n-p)\*se.beta2 ))

###################################3e C.I. about the mean response at x1=35, x2= 45, x3=2.2

xh= c(1, 35, 45, 2.2)

(Y.hat.h= xh%\*%beta.hat)

(se.Y.hat.h= sqrt(xh%\*%s2beta%\*%xh))

alpha= .10

print(c(Y.hat.h-qt(1-alpha/2,n-p)\*se.Y.hat.h, Y.hat.h+qt(1-alpha/2,n-p)\*se.Y.hat.h))

##################################################ANOVA for X2

(X1= cbind(rep(1,dim(my\_data)[1]), my\_data[,3])) # cbind = "column-wise bind"

(Y1= my\_data[,1])

t(X1)%\*%as.matrix(X1)

t(X1)%\*%Y1

solve(t(X1)%\*%as.matrix(X1))

(beta.hat= solve(t(X1)%\*%as.matrix(X1))%\*%t(X1)%\*%Y1)

# Plot the estimated response plane

Y1<-my\_data[,1]

x22<-my\_data[,3]

x22s= min(x22); x22m= max(x22)

# expand.grid - creates all combinations of the arguments

grid2= expand.grid(seq(from=min(x22),to=max(x22),length.out=100))

z2= beta.hat[1]+ beta.hat[3]\*grid[,2]

mod2= lm(Y1~x1)

summary(mod2)

anova(mod2)

n1= length(Y1)

p1= 2

J1= matrix(1,nrow= n, ncol= n)

H1= as.matrix(X1)%\*%solve(t(X1)%\*%as.matrix(X1))%\*%t(X1)

I1= diag(rep(1,n1))

(SST1= t(Y1)%\*%(I1-(1/n1)\*J1)%\*%Y1)

(SSE1= t(Y1)%\*%(I1-H1)%\*%Y1)

(SSR1= t(Y1)%\*%(H1-(1/n1)\*J1)%\*%Y1)

########################################## 3f & g ###############################################3

mod.for.anova= lm(my\_data$Satis~my\_data$Severity+my\_data$Age+my\_data$Anxiety)

summary(mod.for.anova)

fit.aov <- anova(mod.for.anova)

tab <- as.table(cbind(

'SS' = c("SSR(x1, x2, x3)" = sum(fit.aov[1:3, 2]),

"SSR(x2)" = fit.aov[1, 2],

"SSR(x1|x2)" = fit.aov[2, 2],

"SSR(x3|x2, x1)" = fit.aov[3, 2],

"SSE" = fit.aov[4, 2],

"Total" = sum(fit.aov[, 2])),

'Df' = c( sum(fit.aov[1:3, 1]),

fit.aov[1, 1],

fit.aov[2, 1],

fit.aov[3, 1],

fit.aov[4, 1],

sum(fit.aov$Df)),

'MS' = c( sum(fit.aov[1:3, 2]) / sum(fit.aov[1:3, 1]),

fit.aov[1, 3],

fit.aov[2, 3],

fit.aov[3, 3],

fit.aov[4, 3],

NA)

))

round(tab, 2)

################################################################################

# Manual ANOVA

n= length(Y)

p= 4

# F test

alpha= .025

(F.stat= (fit.aov[3, 2]/1)/(fit.aov[4, 2]/(n-p))) #test stat

critical.val=(-13.702/7.0997)\*(-13.702/7.0997)

qf(1-alpha,3,n-p)

# Multiple and adjusted Rsquared

(R.sq= SSR/SST)

(R.sq.adj= 1-((SSE/(n-p))/(SST/(n-1))) )

pval = 2 \* pt(F.stat, df=n-4)

pval

# Fit the model "automatically"

mod.x1x2= lm(Y~x1+x2)

summary(mod.x1x2)

anova(mod.x1x2)

# Notice that the ANOVA table finds the SS associated

# with each predictor separtely. Their sum is the

# regression SS.

##################################### 3h #####################################################

fit.mod.h<-lm(my\_data$Satis~my\_data$Age)

anova(fit.mod.h,mod1)

######################################### 3i #################################################

fit.mod.i<-lm(my\_data$Satis+my\_data$Age~my\_data$Anxiety)

anova(fit.mod.h,mod1)

###################################### 3j ####################################################

fit.mod.j<-lm(my\_data$Satis~my\_data$Age+my\_data$Severity)

summary(fit.mod.j)

anova(fit.mod.j)

###################################### 3l ####################################################

fit.mod.l.x1<-lm(my\_data$Satis~my\_data$Age)

summary(fit.mod.l.x1)

anova(fit.mod.l.x1)

fit.mod.l.x2<-lm(my\_data$Satis~my\_data$Severity)

summary(fit.mod.l.x2)

anova(fit.mod.l.x2)

fit.mod.l.x1.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Age)

summary(fit.mod.l.x1.x3)

anova(fit.mod.l.x1.x3)

fit.mod.l.x2.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Severity)

summary(fit.mod.l.x2.x3)

anova(fit.mod.l.x2.x3)

################################ 3n ###########################################

n= length(Y)

y.val.satis<-(1/sqrt(n-1)) \* ((my\_data$Satis -mean(my\_data$Satis))/sd(my\_data$Satis))

x.val.age<-(1/sqrt(n-1)) \* ((my\_data$Age -mean(my\_data$Age))/sd(my\_data$Age))

x.val.sev<-(1/sqrt(n-1)) \* ((my\_data$Severity -mean(my\_data$Severity))/sd(my\_data$Severity))

x.val.anxi<-(1/sqrt(n-1)) \* ((my\_data$Anxiety -mean(my\_data$Anxiety))/sd(my\_data$Anxiety))

mod.new<-lm(y.val.satis~x.val.age+x.val.sev+x.val.anxi)

summary(mod.new)

################################ 3p ##########################################

beta1.age<-(sd(my\_data$Satis)/sd(my\_data$Age))\*(-5.907e-01)

beta1.age

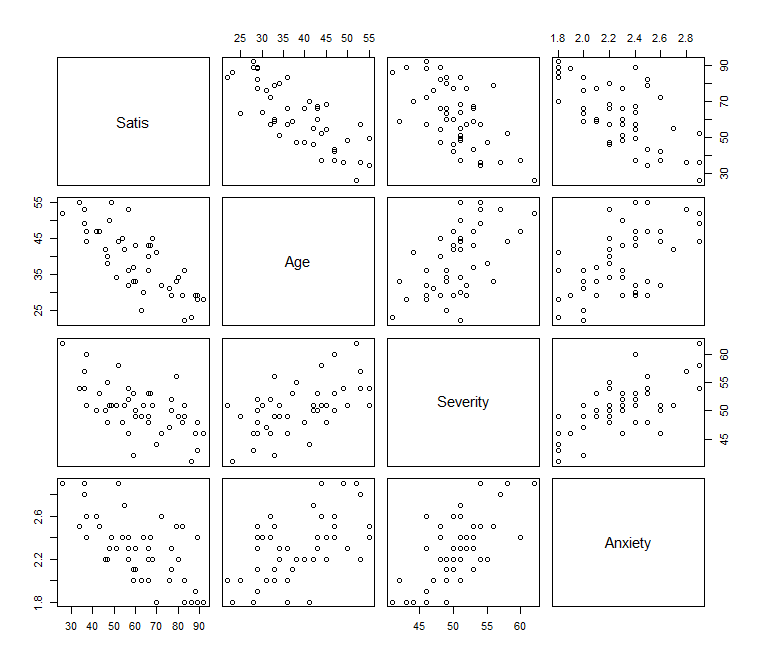
beta1.Severity<-(sd(my\_data$Satis)/sd(my\_data$Severity))\*(-1.106e-01)

beta1.Severity

beta1.Anxiety<-(sd(my\_data$Satis)/sd(my\_data$Anxiety))\*(-2.339e-01)

beta1.Anxiety

**3 A)**



> cor(my\_data) #ANS: 3a corelation

Satis Age Severity Anxiety

Satis 1.0000000 -0.7867555 -0.6029417 -0.6445910

Age -0.7867555 1.0000000 0.5679505 0.5696775

Severity -0.6029417 0.5679505 1.0000000 0.6705287

Anxiety -0.6445910 0.5696775 0.6705287 1.0000000

**3 B)**

summary(mod1)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Severity +

my\_data$Anxiety)

Residuals:

Min 1Q Median 3Q Max

-18.3524 -6.4230 0.5196 8.3715 17.1601

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 158.4913 18.1259 8.744 5.26e-11 \*\*\*

my\_data$Age -1.1416 0.2148 -5.315 3.81e-06 \*\*\*

my\_data$Severity -0.4420 0.4920 -0.898 0.3741

my\_data$Anxiety -13.4702 7.0997 -1.897 0.0647 .

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.06 on 42 degrees of freedom

Multiple R-squared: 0.6822, Adjusted R-squared: 0.6595

F-statistic: 30.05 on 3 and 42 DF, p-value: 1.542e-10

> anova(mod1)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 81.8026 2.059e-11 \*\*\*

my\_data$Severity 1 480.9 480.9 4.7539 0.03489 \*

my\_data$Anxiety 1 364.2 364.2 3.5997 0.06468 .

Residuals 42 4248.8 101.2

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> # Calculate the matrices manually

> (X= cbind(rep(1,dim(my\_data)[1]), my\_data[,2:4])) # cbind = "column-wise bind"

rep(1, dim(my\_data)[1]) Age Severity Anxiety

1 1 50 51 2.3

2 1 36 46 2.3

3 1 40 48 2.2

4 1 41 44 1.8

5 1 28 43 1.8

6 1 49 54 2.9

7 1 42 50 2.2

8 1 45 48 2.4

9 1 52 62 2.9

10 1 29 50 2.1

11 1 29 48 2.4

12 1 43 53 2.4

13 1 38 55 2.2

14 1 34 51 2.3

15 1 53 54 2.2

16 1 36 49 2.0

17 1 33 56 2.5

18 1 29 46 1.9

19 1 33 49 2.1

20 1 55 51 2.4

21 1 29 52 2.3

22 1 44 58 2.9

23 1 43 50 2.3

24 1 23 41 1.8

25 1 47 53 2.5

26 1 55 54 2.5

27 1 25 49 2.0

28 1 32 46 2.6

29 1 32 52 2.4

30 1 42 51 2.7

31 1 33 42 2.0

32 1 36 49 1.8

33 1 31 47 2.0

34 1 40 48 2.2

35 1 53 57 2.8

36 1 34 49 2.2

37 1 29 48 2.5

38 1 30 51 2.4

39 1 47 60 2.4

40 1 47 50 2.6

41 1 43 53 2.3

42 1 22 51 2.0

43 1 44 51 2.6

44 1 45 51 2.2

45 1 37 53 2.1

46 1 28 46 1.8

> (Y= my\_data[,1])

[1] 48 57 66 70 89 36 46 54 26 77 89 67 47 51 57 66 79 88 60 49 77 52 60 86 43 34 63 72 57 55 59 83 76 47 36 80

[37] 82 64 37 42 66 83 37 68 59 92

> t(X)%\*%as.matrix(X)

rep(1, dim(my\_data)[1]) Age Severity Anxiety

rep(1, dim(my\_data)[1]) 46.0 1766.0 2320.0 105.20

Age 1766.0 71378.0 90051.0 4107.20

Severity 2320.0 90051.0 117846.0 5344.70

Anxiety 105.2 4107.2 5344.7 244.62

> t(X)%\*%Y

[,1]

rep(1, dim(my\_data)[1]) 2832

Age 103282

Severity 140814

Anxiety 6327

> solve(t(X)%\*%as.matrix(X))

rep(1, dim(my\_data)[1]) Age Severity Anxiety

rep(1, dim(my\_data)[1]) 3.247711653 0.0092211391 -0.0679307897 -0.067298817

Age 0.009221139 0.0004560816 -0.0003185955 -0.004662271

Severity -0.067930790 -0.0003185955 0.0023924814 -0.017710085

Anxiety -0.067298817 -0.0046622713 -0.0177100848 0.498257730

> (beta.hat= solve(t(X)%\*%as.matrix(X))%\*%t(X)%\*%Y)

[,1]

rep(1, dim(my\_data)[1]) 158.4912517

Age -1.1416118

Severity -0.4420043

Anxiety -13.4701632

> # Plot the estimated response plane

> Y<-my\_data[,1]

> x1<-my\_data[,2]

> x2<-my\_data[,3]

> x1s= min(x1); x1m= max(x1)

> x3<-my\_data[,4]

> x2s= min(x2); x2m= max(x2)

> x3s= min(x3); x3m= max(x3)

> # expand.grid - creates all combinations of the arguments

> grid= expand.grid(seq(from=min(x1),to=max(x1),length.out=100),

+ seq(from=min(x2),to=max(x2),length.out=100),

+ seq(from=min(x3),to=max(x3),length.out=100))

> z= beta.hat[1]+ beta.hat[2]\*grid[,1] + beta.hat[3]\*grid[,2] + beta.hat[4]\*grid[,3]

> # Manual ANOVA

> n= length(Y)

> p= 4

> J= matrix(1,nrow= n, ncol= n)

> H= as.matrix(X)%\*%solve(t(X)%\*%as.matrix(X))%\*%t(X)

> I= diag(rep(1,n))

> (SST= t(Y)%\*%(I-(1/n)\*J)%\*%Y)

[,1]

[1,] 13369.3

> (SSE= t(Y)%\*%(I-H)%\*%Y)

[,1]

[1,] 4248.841

> (SSR= t(Y)%\*%(H-(1/n)\*J)%\*%Y)

[,1]

[1,] 9120.464

> # F test

> alpha= .10

> (F.stat= (SSR/(p-1))/(SSE/(n-p))) #test stat

[,1]

[1,] 30.05208

> qf(1-alpha,p-1,n-p) # Critical value for the above test

[1] 2.219059

> pval = 2 ∗ pt(F.stat, df=n−4)

> pval

[,1]

[1,] 2

> # Multiple and adjusted Rsquared

> (R.sq= SSR/SST)

[,1]

[1,] 0.6821943

> (R.sq.adj= 1-((SSE/(n-p))/(SST/(n-1)) ) )

[,1]

[1,] 0.6594939

> # Fit the model "automatically"

> mod1= lm(Y~x1+x2+x3)

> summary(mod1)

Call:

lm(formula = Y ~ x1 + x2 + x3)

Residuals:

Min 1Q Median 3Q Max

-18.3524 -6.4230 0.5196 8.3715 17.1601

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 158.4913 18.1259 8.744 5.26e-11 \*\*\*

x1 -1.1416 0.2148 -5.315 3.81e-06 \*\*\*

x2 -0.4420 0.4920 -0.898 0.3741

x3 -13.4702 7.0997 -1.897 0.0647 .

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.06 on 42 degrees of freedom

Multiple R-squared: 0.6822, Adjusted R-squared: 0.6595

F-statistic: 30.05 on 3 and 42 DF, p-value: 1.542e-10

> anova(mod1)

Analysis of Variance Table

Response: Y

Df Sum Sq Mean Sq F value Pr(>F)

x1 1 8275.4 8275.4 81.8026 2.059e-11 \*\*\*

x2 1 480.9 480.9 4.7539 0.03489 \*

x3 1 364.2 364.2 3.5997 0.06468 .

Residuals 42 4248.8 101.2

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**3 C**

############################################# 3c ############################

> # Manual ANOVA

> n= length(Y)

> p= 4

> J= matrix(1,nrow= n, ncol= n)

> H= as.matrix(X)%\*%solve(t(X)%\*%as.matrix(X))%\*%t(X)

> I= diag(rep(1,n))

> (SST= t(Y)%\*%(I-(1/n)\*J)%\*%Y)

[,1]

[1,] 13369.3

> (SSE= t(Y)%\*%(I-H)%\*%Y)

[,1]

[1,] 4248.841

> (SSR= t(Y)%\*%(H-(1/n)\*J)%\*%Y)

[,1]

[1,] 9120.464

> # F test

> alpha= .10

> (F.stat= (SSR/(p-1))/(SSE/(n-p))) #test stat

[,1]

[1,] 30.05208

> qf(1-alpha,p-1,n-p) # Critical value for the above test

[1] 2.219059

> pval = 2 ∗ pt(F.stat, df=n−4)

> pval

[,1]

[1,] 2

> # Multiple and adjusted Rsquared

> (R.sq= SSR/SST)

[,1]

[1,] 0.6821943

> (R.sq.adj= 1-((SSE/(n-p))/(SST/(n-1)) ) )

[,1]

[1,] 0.6594939

**3 d)**

> n= length(Y)

> p= 4

> J= matrix(1,nrow= n, ncol= n)

> H= as.matrix(X)%\*%solve(t(X)%\*%as.matrix(X))%\*%t(X)

> I= diag(rep(1,n))

> (SST= t(Y)%\*%(I-(1/n)\*J)%\*%Y)

[,1]

[1,] 13369.3

> (SSE= t(Y)%\*%(I-H)%\*%Y)

[,1]

[1,] 4248.841

> (SSR= t(Y)%\*%(H-(1/n)\*J)%\*%Y)

[,1]

[1,] 9120.464

> # Multiple and adjusted Rsquared

> (R.sq= SSR/SST)

[,1]

[1,] 0.6821943

> (R.sq.adj= 1-((SSE/(n-p))/(SST/(n-1)) ) )

[,1]

[1,] 0.6594939

**3 e)**

|  |
| --- |
| > # C.I. about the mean response at x1=35, x2= 45, x3=2.2  > xh= c(1, 35, 45, 2.2)  > (Y.hat.h= xh%\*%beta.hat)  [,1]  [1,] 69.01029  > (se.Y.hat.h= sqrt(xh%\*%s2beta%\*%xh))  [,1]  [1,] 2.664612  > alpha= .10  > print(c(Y.hat.h-qt(1-alpha/2,n-p)\*se.Y.hat.h, Y.hat.h+qt(1-alpha/2,n-p)\*se.Y.hat.h))  [1] 64.52854 73.49204 |
|  |
| |  | | --- | | > | |

**3 f)** SS Df MS

SSR(x1, x2, x3) 9120.46 3.00 3040.15

SSR(x2) 4860.26 1.00 4860.26

SSR(x1|x2) 3896.04 1.00 3896.04

SSR(x3|x2, x1) 364.16 1.00 364.16

SSE 4248.84 42.00 101.16

Total 13369.30 45.00

**3 g)** Call:

lm(formula = my\_data$Satis ~ my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-23.203 -10.839 -1.113 10.342 30.843

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 183.0770 24.3249 7.526 1.95e-09 \*\*\*

my\_data$Severity -2.4093 0.4806 -5.013 9.23e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 13.91 on 44 degrees of freedom

Multiple R-squared: 0.3635, Adjusted R-squared: 0.3491

F-statistic: 25.13 on 1 and 44 DF, p-value: 9.23e-06

> anova(fit.mod.g)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Severity 1 4860.3 4860.3 25.132 9.23e-06 \*\*\*

Residuals 44 8509.0 193.4

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**3 h)** > fit.mod.h<-lm(my\_data$Satis~my\_data$Age)

> anova(fit.mod.h,mod1)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 71.481 9.058e-11 \*\*\*

Residuals 44 5093.9 115.8

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**3 i)** > fit.mod.h<-lm(my\_data$Satis+my\_data$Age~my\_data$Anxiety)

> anova(fit.mod.h,mod1)

Analysis of Variance Table

Response: my\_data$Satis + my\_data$Age

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 1636.3 1636.26 16.26 0.0002162 \*\*\*

Residuals 44 4427.7 100.63

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**3 j)** > fit.mod.j<-lm(my\_data$Satis~my\_data$Age+my\_data$Severity)

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

my\_data$Age -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

my\_data$Severity -0.9208 0.4349 -2.117 0.0401 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> anova(fit.mod.j)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 77.1389 3.802e-11 \*\*\*

my\_data$Severity 1 480.9 480.9 4.4828 0.04006 \*

Residuals 43 4613.0 107.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**3 l)** > ###################################### 3l ####################################################

> fit.mod.l.x1<-lm(my\_data$Satis~my\_data$Age)

> anova(fit.mod.l.x1)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 71.481 9.058e-11 \*\*\*

Residuals 44 5093.9 115.8

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> summary(fit.mod.l.x1)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-18.9281 -9.6808 0.7573 10.8913 17.7986

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 119.9432 7.0848 16.930 < 2e-16 \*\*\*

my\_data$Age -1.5206 0.1799 -8.455 9.06e-11 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.76 on 44 degrees of freedom

Multiple R-squared: 0.619, Adjusted R-squared: 0.6103

F-statistic: 71.48 on 1 and 44 DF, p-value: 9.058e-11

> fit.mod.l.x2<-lm(my\_data$Satis~my\_data$Severity)

> summary(fit.mod.l.x2)

Call:

lm(formula = my\_data$Satis ~ my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-23.203 -10.839 -1.113 10.342 30.843

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 183.0770 24.3249 7.526 1.95e-09 \*\*\*

my\_data$Severity -2.4093 0.4806 -5.013 9.23e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 13.91 on 44 degrees of freedom

Multiple R-squared: 0.3635, Adjusted R-squared: 0.3491

F-statistic: 25.13 on 1 and 44 DF, p-value: 9.23e-06

> fit.mod.l.x1.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Age)

> anova(fit.mod.l.x2)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Severity 1 4860.3 4860.3 25.132 9.23e-06 \*\*\*

Residuals 44 8509.0 193.4

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> summary(fit.mod.l.x1.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Anxiety + my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-19.4453 -7.3285 0.6733 8.5126 18.0534

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 145.9412 11.5251 12.663 4.21e-16 \*\*\*

my\_data$Anxiety -16.7421 6.0808 -2.753 0.00861 \*\*

my\_data$Age -1.2005 0.2041 -5.882 5.43e-07 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.04 on 43 degrees of freedom

Multiple R-squared: 0.6761, Adjusted R-squared: 0.661

F-statistic: 44.88 on 2 and 43 DF, p-value: 2.98e-11

> anova(fit.mod.l.x1.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 55.158 3.117e-09 \*\*\*

my\_data$Age 1 3483.9 3483.9 34.593 5.434e-07 \*\*\*

Residuals 43 4330.5 100.7

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x2.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Severity)

> summary(fit.mod.l.x2.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Anxiety + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-20.234 -9.685 -2.054 9.632 29.689

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 181.5726 22.4927 8.073 3.74e-10 \*\*\*

my\_data$Anxiety -25.1402 8.6295 -2.913 0.00565 \*\*

my\_data$Severity -1.2395 0.5988 -2.070 0.04451 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 12.86 on 43 degrees of freedom

Multiple R-squared: 0.4685, Adjusted R-squared: 0.4437

F-statistic: 18.95 on 2 and 43 DF, p-value: 1.256e-06

> anova(fit.mod.l.x2.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 33.612 7.197e-07 \*\*\*

my\_data$Severity 1 708.0 708.0 4.284 0.04451 \*

Residuals 43 7106.4 165.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**3 n)**

> summary(mod.new)

Call:

lm(formula = y.val.satis ~ x.val.age + x.val.sev + x.val.anxi)

Residuals:

Min 1Q Median 3Q Max

-0.158723 -0.055550 0.004493 0.072402 0.148411

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -2.485e-17 1.283e-02 0.000 1.0000

x.val.age -5.907e-01 1.111e-01 -5.315 3.81e-06 \*\*\*

x.val.sev -1.106e-01 1.231e-01 -0.898 0.3741

x.val.anxi -2.339e-01 1.233e-01 -1.897 0.0647 .

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.08699 on 42 degrees of freedom

Multiple R-squared: 0.6822, Adjusted R-squared: 0.6595

F-statistic: 30.05 on 3 and 42 DF, p-value: 1.542e-10

**3 p)** > beta1.age

[1] -1.141677

> beta1.Severity<-(sd(my\_data$Satis)/sd(my\_data$Severity))\*(-1.106e-01)

> beta1.Severity

[1] -0.4419446

> beta1.Anxiety<-(sd(my\_data$Satis)/sd(my\_data$Anxiety))\*(-2.339e-01)

> beta1.Anxiety

[1] -13.46837

**4 A)** Call:

lm(formula = V4 ~ V1)

Residuals:

Min 1Q Median 3Q Max

-6.1195 -2.1904 0.6735 1.9383 3.8523

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -1.4961 3.3192 -0.451 0.658

V1 0.8572 0.1288 6.656 3.02e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.82 on 18 degrees of freedom

Multiple R-squared: 0.7111, Adjusted R-squared: 0.695

F-statistic: 44.3 on 1 and 18 DF, p-value: 3.024e-06

-23.203 -10.839 -1.113 10.342 30.843

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 183.0770 24.3249 7.526 1.95e-09 \*\*\*

my\_data$Severity -2.4093 0.4806 -5.013 9.23e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 13.91 on 44 degrees of freedom

Multiple R-squared: 0.3635, Adjusted R-squared: 0.3491

F-statistic: 25.13 on 1 and 44 DF, p-value: 9.23e-06

> anova(fit.mod.g)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Severity 1 4860.3 4860.3 25.132 9.23e-06 \*\*\*

Residuals 44 8509.0 193.4

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.h<-lm(my\_data$Satis~my\_data$Age)

> anova(fit.mod.h,mod1)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 71.481 9.058e-11 \*\*\*

Residuals 44 5093.9 115.8

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Warning message:

In anova.lmlist(object, ...) :

models with response ‘"Y"’ removed because response differs from model 1

> n= length(Y)

> p= 4

> # F test

> alpha= .025

> (F.stat= (fit.aov[3, 2]/1)/(fit.aov[4, 2]/(n-p))) #test stat

[1] 3.599735

> critical.val=(-13.702/7.0997)\*(-13.702/7.0997)

> qf(1-alpha,3,n-p)

[1] 3.445689

> (R.sq= SSR/SST)

[,1]

[1,] 0.6821943

> # Multiple and adjusted Rsquared

> (R.sq.adj= 1-((SSE/(n-p))/(SST/(n-1))) )

[,1]

[1,] 0.6594939

> pval = 2 \* pt(F.stat, df=n-4)

> pval

[1] 1.999166

> # Fit the model "automatically"

> mod.x1x2= lm(Y~x1+x2)

> summary(mod.x1x2)

Call:

lm(formula = Y ~ x1 + x2)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

x1 -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

x2 -0.9208 0.4349 -2.117 0.0401 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> anova(mod.x1x2)

Analysis of Variance Table

Response: Y

Df Sum Sq Mean Sq F value Pr(>F)

x1 1 8275.4 8275.4 77.1389 3.802e-11 \*\*\*

x2 1 480.9 480.9 4.4828 0.04006 \*

Residuals 43 4613.0 107.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.h<-lm(my\_data$Satis~my\_data$Anxiety)

> anova(fit.mod.h,mod1)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 31.278 1.335e-06 \*\*\*

Residuals 44 7814.4 177.6

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Warning message:

In anova.lmlist(object, ...) :

models with response ‘"Y"’ removed because response differs from model 1

> fit.mod.j<-lm(my\_data$Satis~my\_data$Age+my\_data$Severity)

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

my\_data$Age -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

my\_data$Severity -0.9208 0.4349 -2.117 0.0401 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> anova(fit.mod.j)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 77.1389 3.802e-11 \*\*\*

my\_data$Severity 1 480.9 480.9 4.4828 0.04006 \*

Residuals 43 4613.0 107.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.h<-lm(my\_data$Satis~my\_data$Anxiety)

> anova(fit.mod.h,mod1)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 31.278 1.335e-06 \*\*\*

Residuals 44 7814.4 177.6

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Warning message:

In anova.lmlist(object, ...) :

models with response ‘"Y"’ removed because response differs from model 1

> View(my\_data)

> fit.mod.j<-lm(my\_data$Satis~my\_data$Age+my\_data$Severity)

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

my\_data$Age -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

my\_data$Severity -0.9208 0.4349 -2.117 0.0401 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> anova(fit.mod.j)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 77.1389 3.802e-11 \*\*\*

my\_data$Severity 1 480.9 480.9 4.4828 0.04006 \*

Residuals 43 4613.0 107.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.h<-lm(my\_data$Satis~my\_data$Anxiety)

> fit.mod.h<-lm(my\_data$Satis+my\_data$Age~my\_data$Anxiety)

> anova(fit.mod.h,mod1)

Analysis of Variance Table

Response: my\_data$Satis + my\_data$Age

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 1636.3 1636.26 16.26 0.0002162 \*\*\*

Residuals 44 4427.7 100.63

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Warning message:

In anova.lmlist(object, ...) :

models with response ‘"Y"’ removed because response differs from model 1

> fit.mod.g<-lm(my\_data$Satis~my\_data$Severity)

> anova(fit.mod.g)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Severity 1 4860.3 4860.3 25.132 9.23e-06 \*\*\*

Residuals 44 8509.0 193.4

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> anova(fit.mod.h,mod1)

Analysis of Variance Table

Response: my\_data$Satis + my\_data$Age

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 1636.3 1636.26 16.26 0.0002162 \*\*\*

Residuals 44 4427.7 100.63

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Warning message:

In anova.lmlist(object, ...) :

models with response ‘"Y"’ removed because response differs from model 1

> fit.mod.j<-lm(my\_data$Satis~my\_data$Age+my\_data$Severity)

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

my\_data$Age -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

my\_data$Severity -0.9208 0.4349 -2.117 0.0401 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> anova(fit.mod.j)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 77.1389 3.802e-11 \*\*\*

my\_data$Severity 1 480.9 480.9 4.4828 0.04006 \*

Residuals 43 4613.0 107.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

my\_data$Age -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

my\_data$Severity -0.9208 0.4349 -2.117 0.0401 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> fit.mod.j<-lm(my\_data$Satis~my\_data$Age)

> anova(fit.mod.j)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 71.481 9.058e-11 \*\*\*

Residuals 44 5093.9 115.8

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x1<-lm(my\_data$Satis~my\_data$Age)

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-18.9281 -9.6808 0.7573 10.8913 17.7986

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 119.9432 7.0848 16.930 < 2e-16 \*\*\*

my\_data$Age -1.5206 0.1799 -8.455 9.06e-11 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.76 on 44 degrees of freedom

Multiple R-squared: 0.619, Adjusted R-squared: 0.6103

F-statistic: 71.48 on 1 and 44 DF, p-value: 9.058e-11

> anova(fit.mod.j)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 71.481 9.058e-11 \*\*\*

Residuals 44 5093.9 115.8

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x2<-lm(my\_data$Satis~my\_data$Age)

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-18.9281 -9.6808 0.7573 10.8913 17.7986

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 119.9432 7.0848 16.930 < 2e-16 \*\*\*

my\_data$Age -1.5206 0.1799 -8.455 9.06e-11 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.76 on 44 degrees of freedom

Multiple R-squared: 0.619, Adjusted R-squared: 0.6103

F-statistic: 71.48 on 1 and 44 DF, p-value: 9.058e-11

> fit.mod.l.x2<-lm(my\_data$Satis~my\_data$Severity)

> fit.mod.l.x1<-lm(my\_data$Satis~my\_data$Age)

> summary(fit.mod.l.x1)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-18.9281 -9.6808 0.7573 10.8913 17.7986

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 119.9432 7.0848 16.930 < 2e-16 \*\*\*

my\_data$Age -1.5206 0.1799 -8.455 9.06e-11 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.76 on 44 degrees of freedom

Multiple R-squared: 0.619, Adjusted R-squared: 0.6103

F-statistic: 71.48 on 1 and 44 DF, p-value: 9.058e-11

> anova(fit.mod.l.x1)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 71.481 9.058e-11 \*\*\*

Residuals 44 5093.9 115.8

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> summary(fit.mod.l.x2)

Call:

lm(formula = my\_data$Satis ~ my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-23.203 -10.839 -1.113 10.342 30.843

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 183.0770 24.3249 7.526 1.95e-09 \*\*\*

my\_data$Severity -2.4093 0.4806 -5.013 9.23e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 13.91 on 44 degrees of freedom

Multiple R-squared: 0.3635, Adjusted R-squared: 0.3491

F-statistic: 25.13 on 1 and 44 DF, p-value: 9.23e-06

> anova(fit.mod..l.x2)

Error in anova(fit.mod..l.x2) : object 'fit.mod..l.x2' not found

> anova(fit.mod.l.x2)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Severity 1 4860.3 4860.3 25.132 9.23e-06 \*\*\*

Residuals 44 8509.0 193.4

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x1.x3<-lm(my\_data$Satis~my\_data$Age+my\_data$Anxiety)

> fit.mod.l.x1.x3<-lm(my\_data$Satis~my\_data$Age+my\_data$Anxiety)

> summary(fit.mod.l.x1.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Anxiety)

Residuals:

Min 1Q Median 3Q Max

-19.4453 -7.3285 0.6733 8.5126 18.0534

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 145.9412 11.5251 12.663 4.21e-16 \*\*\*

my\_data$Age -1.2005 0.2041 -5.882 5.43e-07 \*\*\*

my\_data$Anxiety -16.7421 6.0808 -2.753 0.00861 \*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.04 on 43 degrees of freedom

Multiple R-squared: 0.6761, Adjusted R-squared: 0.661

F-statistic: 44.88 on 2 and 43 DF, p-value: 2.98e-11

> anova(fit.mod.l.x1.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 82.1711 1.557e-11 \*\*\*

my\_data$Anxiety 1 763.4 763.4 7.5804 0.00861 \*\*

Residuals 43 4330.5 100.7

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x1.x3<-lm(my\_data$Satis+my\_data$Anxiety~my\_data$Age)

> summary(fit.mod.l.x1.x3)

Call:

lm(formula = my\_data$Satis + my\_data$Anxiety ~ my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-18.9590 -9.6412 0.6977 10.8973 17.3573

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 121.4960 7.0230 17.300 < 2e-16 \*\*\*

my\_data$Age -1.5015 0.1783 -8.422 1.01e-10 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.67 on 44 degrees of freedom

Multiple R-squared: 0.6171, Adjusted R-squared: 0.6084

F-statistic: 70.93 on 1 and 44 DF, p-value: 1.008e-10

> anova(fit.mod.l.x1.x3)

Analysis of Variance Table

Response: my\_data$Satis + my\_data$Anxiety

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8068.6 8068.6 70.926 1.008e-10 \*\*\*

Residuals 44 5005.4 113.8

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x1.x3<-lm(my\_data$Satis~my\_data$Anxiety)

> summary(fit.mod.l.x1.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Anxiety)

Residuals:

Min 1Q Median 3Q Max

-20.369 -9.606 -1.946 9.212 31.631

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 146.449 15.304 9.569 2.55e-12 \*\*\*

my\_data$Anxiety -37.117 6.637 -5.593 1.33e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 13.33 on 44 degrees of freedom

Multiple R-squared: 0.4155, Adjusted R-squared: 0.4022

F-statistic: 31.28 on 1 and 44 DF, p-value: 1.335e-06

> anova(fit.mod.l.x1.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 31.278 1.335e-06 \*\*\*

Residuals 44 7814.4 177.6

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x1.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Age)

> summary(fit.mod.l.x1.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Anxiety + my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-19.4453 -7.3285 0.6733 8.5126 18.0534

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 145.9412 11.5251 12.663 4.21e-16 \*\*\*

my\_data$Anxiety -16.7421 6.0808 -2.753 0.00861 \*\*

my\_data$Age -1.2005 0.2041 -5.882 5.43e-07 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.04 on 43 degrees of freedom

Multiple R-squared: 0.6761, Adjusted R-squared: 0.661

F-statistic: 44.88 on 2 and 43 DF, p-value: 2.98e-11

> anova(fit.mod.l.x1.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 55.158 3.117e-09 \*\*\*

my\_data$Age 1 3483.9 3483.9 34.593 5.434e-07 \*\*\*

Residuals 43 4330.5 100.7

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x2.x3<-lm(my\_data$Satis~my\_data$Severity+my\_data$Age)

> summary(fit.mod.l.x2.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Severity + my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

my\_data$Severity -0.9208 0.4349 -2.117 0.0401 \*

my\_data$Age -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> anova(fit.mod.l.x2.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Severity 1 4860.3 4860.3 45.305 3.161e-08 \*\*\*

my\_data$Age 1 3896.0 3896.0 36.317 3.348e-07 \*\*\*

Residuals 43 4613.0 107.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x2.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Severity)

> summary(fit.mod.l.x2.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Anxiety + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-20.234 -9.685 -2.054 9.632 29.689

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 181.5726 22.4927 8.073 3.74e-10 \*\*\*

my\_data$Anxiety -25.1402 8.6295 -2.913 0.00565 \*\*

my\_data$Severity -1.2395 0.5988 -2.070 0.04451 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 12.86 on 43 degrees of freedom

Multiple R-squared: 0.4685, Adjusted R-squared: 0.4437

F-statistic: 18.95 on 2 and 43 DF, p-value: 1.256e-06

> anova(fit.mod.l.x2.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 33.612 7.197e-07 \*\*\*

my\_data$Severity 1 708.0 708.0 4.284 0.04451 \*

Residuals 43 7106.4 165.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x2.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Severity)

> summary(fit.mod.l.x2.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Anxiety + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-20.234 -9.685 -2.054 9.632 29.689

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 181.5726 22.4927 8.073 3.74e-10 \*\*\*

my\_data$Anxiety -25.1402 8.6295 -2.913 0.00565 \*\*

my\_data$Severity -1.2395 0.5988 -2.070 0.04451 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 12.86 on 43 degrees of freedom

Multiple R-squared: 0.4685, Adjusted R-squared: 0.4437

F-statistic: 18.95 on 2 and 43 DF, p-value: 1.256e-06

> anova(fit.mod.l.x2.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 33.612 7.197e-07 \*\*\*

my\_data$Severity 1 708.0 708.0 4.284 0.04451 \*

Residuals 43 7106.4 165.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> ###################################### 3l ####################################################

> fit.mod.l.x1<-lm(my\_data$Satis~my\_data$Age)

> anova(fit.mod.l.x1)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 71.481 9.058e-11 \*\*\*

Residuals 44 5093.9 115.8

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> summary(fit.mod.l.x1)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-18.9281 -9.6808 0.7573 10.8913 17.7986

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 119.9432 7.0848 16.930 < 2e-16 \*\*\*

my\_data$Age -1.5206 0.1799 -8.455 9.06e-11 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.76 on 44 degrees of freedom

Multiple R-squared: 0.619, Adjusted R-squared: 0.6103

F-statistic: 71.48 on 1 and 44 DF, p-value: 9.058e-11

> fit.mod.l.x2<-lm(my\_data$Satis~my\_data$Severity)

> summary(fit.mod.l.x2)

Call:

lm(formula = my\_data$Satis ~ my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-23.203 -10.839 -1.113 10.342 30.843

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 183.0770 24.3249 7.526 1.95e-09 \*\*\*

my\_data$Severity -2.4093 0.4806 -5.013 9.23e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 13.91 on 44 degrees of freedom

Multiple R-squared: 0.3635, Adjusted R-squared: 0.3491

F-statistic: 25.13 on 1 and 44 DF, p-value: 9.23e-06

> fit.mod.l.x1.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Age)

> anova(fit.mod.l.x2)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Severity 1 4860.3 4860.3 25.132 9.23e-06 \*\*\*

Residuals 44 8509.0 193.4

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> summary(fit.mod.l.x1.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Anxiety + my\_data$Age)

Residuals:

Min 1Q Median 3Q Max

-19.4453 -7.3285 0.6733 8.5126 18.0534

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 145.9412 11.5251 12.663 4.21e-16 \*\*\*

my\_data$Anxiety -16.7421 6.0808 -2.753 0.00861 \*\*

my\_data$Age -1.2005 0.2041 -5.882 5.43e-07 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.04 on 43 degrees of freedom

Multiple R-squared: 0.6761, Adjusted R-squared: 0.661

F-statistic: 44.88 on 2 and 43 DF, p-value: 2.98e-11

> anova(fit.mod.l.x1.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 55.158 3.117e-09 \*\*\*

my\_data$Age 1 3483.9 3483.9 34.593 5.434e-07 \*\*\*

Residuals 43 4330.5 100.7

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.l.x2.x3<-lm(my\_data$Satis~my\_data$Anxiety+my\_data$Severity)

> summary(fit.mod.l.x2.x3)

Call:

lm(formula = my\_data$Satis ~ my\_data$Anxiety + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-20.234 -9.685 -2.054 9.632 29.689

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 181.5726 22.4927 8.073 3.74e-10 \*\*\*

my\_data$Anxiety -25.1402 8.6295 -2.913 0.00565 \*\*

my\_data$Severity -1.2395 0.5988 -2.070 0.04451 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 12.86 on 43 degrees of freedom

Multiple R-squared: 0.4685, Adjusted R-squared: 0.4437

F-statistic: 18.95 on 2 and 43 DF, p-value: 1.256e-06

> anova(fit.mod.l.x2.x3)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 5554.9 5554.9 33.612 7.197e-07 \*\*\*

my\_data$Severity 1 708.0 708.0 4.284 0.04451 \*

Residuals 43 7106.4 165.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.j<-lm(my\_data$Satis~my\_data$Age+my\_data$Severity)

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

my\_data$Age -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

my\_data$Severity -0.9208 0.4349 -2.117 0.0401 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> anova(fit.mod.j)

Analysis of Variance Table

Response: my\_data$Satis

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Age 1 8275.4 8275.4 77.1389 3.802e-11 \*\*\*

my\_data$Severity 1 480.9 480.9 4.4828 0.04006 \*

Residuals 43 4613.0 107.3

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> fit.mod.i<-lm(my\_data$Satis+my\_data$Age~my\_data$Anxiety)

> anova(fit.mod.h,mod1)

Analysis of Variance Table

Response: my\_data$Satis + my\_data$Age

Df Sum Sq Mean Sq F value Pr(>F)

my\_data$Anxiety 1 1636.3 1636.26 16.26 0.0002162 \*\*\*

Residuals 44 4427.7 100.63

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Warning message:

In anova.lmlist(object, ...) :

models with response ‘"Y"’ removed because response differs from model 1

> fit.mod.j<-lm(my\_data$Satis~my\_data$Age+my\_data$Severity)

> summary(fit.mod.j)

Call:

lm(formula = my\_data$Satis ~ my\_data$Age + my\_data$Severity)

Residuals:

Min 1Q Median 3Q Max

-17.1662 -8.5462 -0.4595 7.1342 17.2364

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 156.6719 18.6396 8.405 1.27e-10 \*\*\*

my\_data$Age -1.2677 0.2104 -6.026 3.35e-07 \*\*\*

my\_data$Severity -0.9208 0.4349 -2.117 0.0401 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 10.36 on 43 degrees of freedom

Multiple R-squared: 0.655, Adjusted R-squared: 0.6389

F-statistic: 40.81 on 2 and 43 DF, p-value: 1.16e-10

> n= length(Y)

> n

[1] 46

> n= length(Y)

> y.val<-(1/sqrt(n-1)) \* ((my\_data$Age -mean(my\_data$Age))/sd(my\_data$Age))

> y.val

[1] 0.194046232 -0.039972070 0.026890302 0.043605895 -0.173696814 0.177330639 0.060321488 0.110468267

[9] 0.227477418 -0.156981221 -0.156981221 0.077037081 -0.006540884 -0.073403256 0.244193011 -0.039972070

[17] -0.090118849 -0.156981221 -0.090118849 0.277624197 -0.156981221 0.093752674 0.077037081 -0.257274780

[25] 0.143899453 0.277624197 -0.223843594 -0.106834442 -0.106834442 0.060321488 -0.090118849 -0.039972070

[33] -0.123550035 0.026890302 0.244193011 -0.073403256 -0.156981221 -0.140265628 0.143899453 0.143899453

[41] 0.077037081 -0.273990373 0.093752674 0.110468267 -0.023256477 -0.173696814

> mod.new<-lm(y.val.satis~x.val.age+x.val.sev+x.val.anxi)

Error in eval(expr, envir, enclos) : object 'y.val.satis' not found

> y.val.satis<-(1/sqrt(n-1)) \* ((my\_data$Satis -mean(my\_data$Satis))/sd(my\_data$Satis))

> x.val.age<-(1/sqrt(n-1)) \* ((my\_data$Age -mean(my\_data$Age))/sd(my\_data$Age))

> x.val.sev<-(1/sqrt(n-1)) \* ((my\_data$Severity -mean(my\_data$Severity))/sd(my\_data$Severity))

> x.val.anxi<-(1/sqrt(n-1)) \* ((my\_data$Anxiety -mean(my\_data$Anxiety))/sd(my\_data$Anxiety))

> mod.new<-lm(y.val.satis~x.val.age+x.val.sev+x.val.anxi)

> Summary(mod.new)

Error in (function (classes, fdef, mtable) :

unable to find an inherited method for function ‘Summary’ for signature ‘"lm"’

> Summary(mod.new)

Error in (function (classes, fdef, mtable) :

unable to find an inherited method for function ‘Summary’ for signature ‘"lm"’

> Summary(mod.new)

Error in (function (classes, fdef, mtable) :

unable to find an inherited method for function ‘Summary’ for signature ‘"lm"’

> mod.new<-lm(y.val.satis~x.val.age+x.val.sev+x.val.anxi)

> Summary(mod.new)

Error in (function (classes, fdef, mtable) :

unable to find an inherited method for function ‘Summary’ for signature ‘"lm"’

> summary(mod.new)

Call:

lm(formula = y.val.satis ~ x.val.age + x.val.sev + x.val.anxi)

Residuals:

Min 1Q Median 3Q Max

-0.158723 -0.055550 0.004493 0.072402 0.148411

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -2.485e-17 1.283e-02 0.000 1.0000

x.val.age -5.907e-01 1.111e-01 -5.315 3.81e-06 \*\*\*

x.val.sev -1.106e-01 1.231e-01 -0.898 0.3741

x.val.anxi -2.339e-01 1.233e-01 -1.897 0.0647 .

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.08699 on 42 degrees of freedom

Multiple R-squared: 0.6822, Adjusted R-squared: 0.6595

F-statistic: 30.05 on 3 and 42 DF, p-value: 1.542e-10

> beta1.age<-sd(sd(my\_data$Satis)/sd(my\_data$Age))

> beta1.age

[1] NA

> beta1.age<-(sd(my\_data$Satis)/sd(my\_data$Age))\*(-5.907e-01)

> beta1.age

[1] -1.141677

> beta1.Severity<-(sd(my\_data$Satis)/sd(my\_data$Severity))\*(-1.106e-01)

> beta1.Severity

[1] -0.4419446

> #####-5.907e-01

> beta1.Anxiety<-(sd(my\_data$Satis)/sd(my\_data$Anxiety))\*(-2.339e-01)

> beta1.Anxiety

[1] -13.46837

Not all of the characters in C:/Users/pallavikaran/Desktop/math\_ans3.R could be encoded using ISO8859-1. To save using a different encoding, choose "File | Save with Encoding..." from the main menu.> beta1.age<-(sd(my\_data$Satis)/sd(my\_data$Age))\*(-5.907e-01)

> beta1.age

[1] -1.141677

> beta1.Severity<-(sd(my\_data$Satis)/sd(my\_data$Severity))\*(-1.106e-01)

> beta1.Severity

[1] -0.4419446

> beta1.Anxiety<-(sd(my\_data$Satis)/sd(my\_data$Anxiety))\*(-2.339e-01)

> beta1.Anxiety

[1] -13.46837

**2)**

> #Author : Pallavi Karan

> #Purpose: Assignmnet no 4

> #Date: 10/10/2016

> rm(list = ls()) #Clear the lists

> #Ans 4

> my\_data <- read.table("D://MATH-DA//bodyfat.txt", sep = "")

> attach(my\_data)

The following objects are masked from my\_data (pos = 4):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 5):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 6):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 13):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 14):

V1, V2, V3, V4

> cor(mydata[,1:3])

Error in is.data.frame(x) : object 'mydata' not found

> cor(my\_data[,1:3])

V1 V2 V3

V1 1.0000000 0.9238425 0.4577772

V2 0.9238425 1.0000000 0.0846675

V3 0.4577772 0.0846675 1.0000000

> rm(list = ls()) #Clear the lists

> #Ans 4

> mydata <- read.table("D://MATH-DA//bodyfat.txt", sep = "")

> attach(mydata)

The following objects are masked from my\_data (pos = 3):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 5):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 6):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 7):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 14):

V1, V2, V3, V4

The following objects are masked from my\_data (pos = 15):

V1, V2, V3, V4

> cor(mydata[,1:3])

V1 V2 V3

V1 1.0000000 0.9238425 0.4577772

V2 0.9238425 1.0000000 0.0846675

V3 0.4577772 0.0846675 1.0000000

> lm.fit <- lm(V4 ~ V1)

> summary(lm.fit)

**A)**

Call:

lm(formula = V4 ~ V1)

Residuals:

Min 1Q Median 3Q Max

-6.1195 -2.1904 0.6735 1.9383 3.8523

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -1.4961 3.3192 -0.451 0.658

V1 0.8572 0.1288 6.656 3.02e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.82 on 18 degrees of freedom

Multiple R-squared: 0.7111, Adjusted R-squared: 0.695

F-statistic: 44.3 on 1 and 18 DF, p-value: 3.024e-06

> lm.fit <- lm(V4 ~ V1)

> summary(lm.fit)

Call:

lm(formula = V4 ~ V1)

Residuals:

Min 1Q Median 3Q Max

-6.1195 -2.1904 0.6735 1.9383 3.8523

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -1.4961 3.3192 -0.451 0.658

V1 0.8572 0.1288 6.656 3.02e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.82 on 18 degrees of freedom

Multiple R-squared: 0.7111, Adjusted R-squared: 0.695

F-statistic: 44.3 on 1 and 18 DF, p-value: 3.024e-06

> plot(lm.fit)

Hit <Return> to see next plot: abline(lm.fit)

Hit <Return> to see next plot: anova(lm.fit)

Hit <Return> to see next plot: confint(lm.fit)

Hit <Return> to see next plot: new.data<-data.frame(V1=25)

> predict.lm(lm.fit, new.data, interval ="confidence")

Error in predict.lm(lm.fit, new.data, interval = "confidence") :

object 'new.data' not found

> new.data<-data.frame(V1=25)

> predict.lm(lm.fit, new.data, interval ="confidence")

fit lwr upr

1 19.93356 18.60632 21.2608

**B)**

Call:

lm(formula = V4 ~ V1 + V2)

Residuals:

Min 1Q Median 3Q Max

-3.9469 -1.8807 0.1678 1.3367 4.0147

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -19.1742 8.3606 -2.293 0.0348 \*

V1 0.2224 0.3034 0.733 0.4737

V2 0.6594 0.2912 2.265 0.0369 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.543 on 17 degrees of freedom

Multiple R-squared: 0.7781, Adjusted R-squared: 0.7519

F-statistic: 29.8 on 2 and 17 DF, p-value: 2.774e-06

> anova(lm.fit1)

Analysis of Variance Table

Response: V4

Df Sum Sq Mean Sq F value Pr(>F)

V1 1 352.27 352.27 54.4661 1.075e-06 \*\*\*

V2 1 33.17 33.17 5.1284 0.0369 \*

Residuals 17 109.95 6.47

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> newdata <- mydata[ which(mydata$V1>24 & mydata$V1<26), ]

> predict.lm(lm.fit1, newdata, interval ="confidence")

fit lwr upr

2 19.15707 17.85493 20.45921

6 22.06082 20.13654 23.98509

10 21.77481 19.99326 23.55636

20 20.05955 18.85874 21.26036

> predict.lm(lm.fit1, newdata, interval ="prediction")

fit lwr upr

2 19.15707 13.63571 24.67842

6 22.06082 16.36059 27.76105

10 21.77481 16.12117 27.42846

20 20.05955 14.56121 25.55789

**5)** #Author : Pallavi Karan

#Date: 10/10/2016

#Purpose: Assignmnet no 4

rm(list = ls()) #Clear the lists

my\_data <- read.table("D://MATH-DA//SteroidLevels.txt", sep = "", header = TRUE)

attach(my\_data)

View(my\_data)

mean.var<-mean(my\_data$Age)

#new.data.age<-sd(my\_data$Age)

#merge(my\_data,diff\_data,diff\_data\_sq,by=c(my\_data$Level,my\_data$Age,diff\_data,diff\_data\_sq) )

my\_data["diff.mean"] <- NA

my\_data$diff.mean<- diff\_data<-(my\_data$Age-mean.var)

my\_data["diff.mean.sq"] <- NA

my\_data$diff.mean.sq<- diff\_data\_sq<-diff\_data^2

lm.fit1 <- lm(my\_data$Level ~ my\_data$diff.mean +my\_data$diff.mean.sq)

summary(lm.fit1)

lm.fit1 <- lm(my\_data$Level ~ my\_data$diff.mean +I(my\_data$diff.mean^2))

new.data<-data.frame((15-mean.var),(15-mean.var)\*(15-mean.var))

predict(lm.fit1, new.data, interval ="prediction",level=0.99)

**A)** View(my\_data)

> mean.var<-mean(my\_data$Age)

> #new.data.age<-sd(my\_data$Age)

> #merge(my\_data,diff\_data,diff\_data\_sq,by=c(my\_data$Level,my\_data$Age,diff\_data,diff\_data\_sq) )

> my\_data["diff.mean"] <- NA

> my\_data$diff.mean<- diff\_data<-(my\_data$Age-mean.var)

> my\_data["diff.mean.sq"] <- NA

> my\_data$diff.mean.sq<- diff\_data\_sq<-diff\_data^2

> lm.fit1 <- lm(my\_data$Level ~ my\_data$diff.mean +my\_data$diff.mean.sq)

> summary(lm.fit1)

Call:

lm(formula = my\_data$Level ~ my\_data$diff.mean + my\_data$diff.mean.sq)

Residuals:

Min 1Q Median 3Q Max

-4.5463 -2.5369 0.3868 2.1973 5.3020

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 21.09416 0.91415 23.075 < 2e-16 \*\*\*

my\_data$diff.mean 1.13736 0.11546 9.851 6.59e-10 \*\*\*

my\_data$diff.mean.sq -0.11840 0.02347 -5.045 3.71e-05 \*\*\*

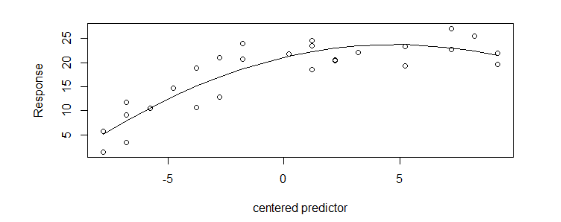
---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.153 on 24 degrees of freedom

Multiple R-squared: 0.8143, Adjusted R-squared: 0.7989

F-statistic: 52.63 on 2 and 24 DF, p-value: 1.678e-09



**B)**

Residuals:

    Min      1Q  Median      3Q     Max

-4.5463 -2.5369  0.3868  2.1973  5.3020

Coefficients:

                  Estimate Std. Error t value Pr(>|t|)

(Intercept)       21.09416    0.91415  23.075  < 2e-16 \*\*\*

Data$diff.mean     1.13736    0.11546   9.851 6.59e-10 \*\*\*

Data$diff.mean.sq -0.11840    0.02347  -5.045 3.71e-05 \*\*\*

---

Signif. codes:  0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**C)** fit      lwr      upr

1 20.13792 10.97342 29.30242

**D)**

Call:

lm(formula = Data$Level ~ Data$diff.mean)

Residuals:

    Min      1Q  Median      3Q     Max

-8.4340 -2.6239  0.5114  3.0677  8.1408

Coefficients:

               Estimate Std. Error t value Pr(>|t|)

(Intercept)     17.6444     0.8533  20.677  < 2e-16 \*\*\*

Data$diff.mean   1.0042     0.1581   6.352  1.2e-06 \*\*\*

---

Signif. codes:  0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1