temp<-c(-5,-4,-3,-2,-1,0,1,2,3,4,5)

chem<-c(1,5,4,7,10,8,9,13,14,13,18)

df <-data.frame(temp,chem)

study.lm<-lm(chem~temp, data = df)

#1

coef(study.lm) #coefficient

summary(study.lm)

par(mfrow=c(2,2))

plot(temp,chem)

lines(chem,study.lm$fitted.values,col=2)

lines(temp,study.lm$fitted.values,col=2)

abline(study.lm,col=3)

#2

anova(study.lm)

#Here we see that the F statistic is 96.18 which is greater than F(1,9,0.95)=5.12 with a p-value very close to zero. The conclusion: there is very strong evidence that H0 : B1 = 0 is false, that is, there is strong evidence that H0:B1=0 is false, that is there is strong evidence that B1≠0. Moreover, we conclude that the regression relationship between temp and chem is significant.

#3

#B1

fit<-lm(chem~temp,data=df)

summary(fit)

confint(fit, 'temp', level=0.95)

#B0

t1<-t.test(chem,temp,paired=TRUE)

t1$estimate

t1$conf.int

#4

new<-data.frame(temp=c(3))

predict(study.lm,newdata=new,interval='confidence')

#5

#6

df<-data.frame(temp,chem)

df

fit1<-lm(chem~temp,data=df)

fit1<-lm(chem~.,data=df)

fit1

summary(fit1) #p-value

model<-step(lm(temp~chem,data=df),k=2,direction='both')

model<-step(lm(temp~chem,data=df),k=2,direction='backward')

model<-step(lm(temp~chem,data=df),k=2,direction='forward')

library(MASS)

step1<-stepAIC(fit1,direction='backward')

step1<-stepAIC(fit1,direction='forward')

step1<-stepAIC(fit1,direction='both')

summary(step1)

#There is no alternative model

regmodel=lm(chem~temp)

summary(regmodel)

fits=regmodel$fitted

resids=regmodel$coeff[2]

beta1hat=regmodel$coeff[2]

confint(regmodel)

predict.lm(regmodel,interval='confidence')