Statistical Modelling using R – CIA3 (21121015_Hemanath Kumar J and 21121034_Vyshak R)

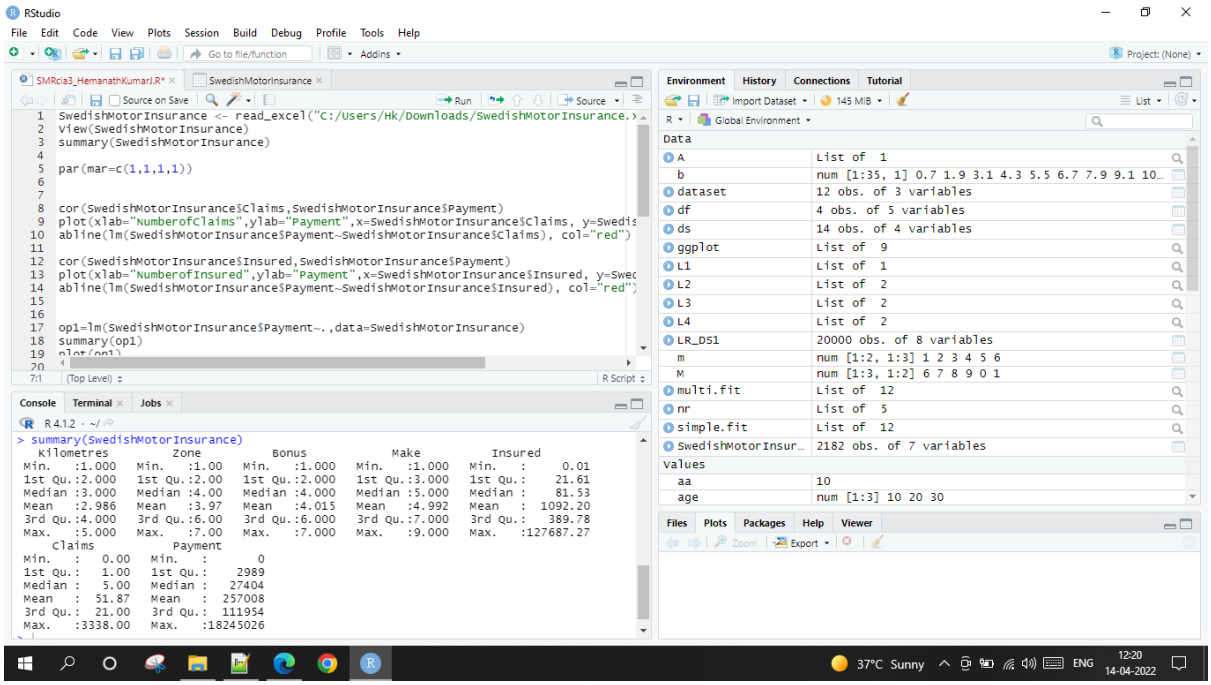
Code:

```
View(SwedishMotorInsurance)

summary(SwedishMotorInsurance)


par(mar=c(1,1,1,1))



cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Payment)

plot(xlab="NumberofClaims",ylab="Payment",x=SwedishMotorInsurance$Claims,
y=SwedishMotorInsurance$Payment)

abline(lm(SwedishMotorInsurance$Payment~SwedishMotorInsurance$Claims), col="red")


cor(SwedishMotorInsurance$Insured,SwedishMotorInsurance$Payment)

plot(xlab="NumberofInsured",ylab="Payment",x=SwedishMotorInsurance$Insured,
y=SwedishMotorInsurance$Payment)

abline(lm(SwedishMotorInsurance$Payment~SwedishMotorInsurance$Insured), col="red")



op1=lm(SwedishMotorInsurance$Payment~.,data=SwedishMotorInsurance)

summary(op1)

plot(op1)


tapply(SwedishMotorInsurance$Payment, SwedishMotorInsurance$Insured, mean)


q3zone<-apply(SwedishMotorInsurance[,c(5,6,7)], 2, function(x) tapply(x,
SwedishMotorInsurance$Zone, mean))

summary(q3zone)

plot(q3zone)
```

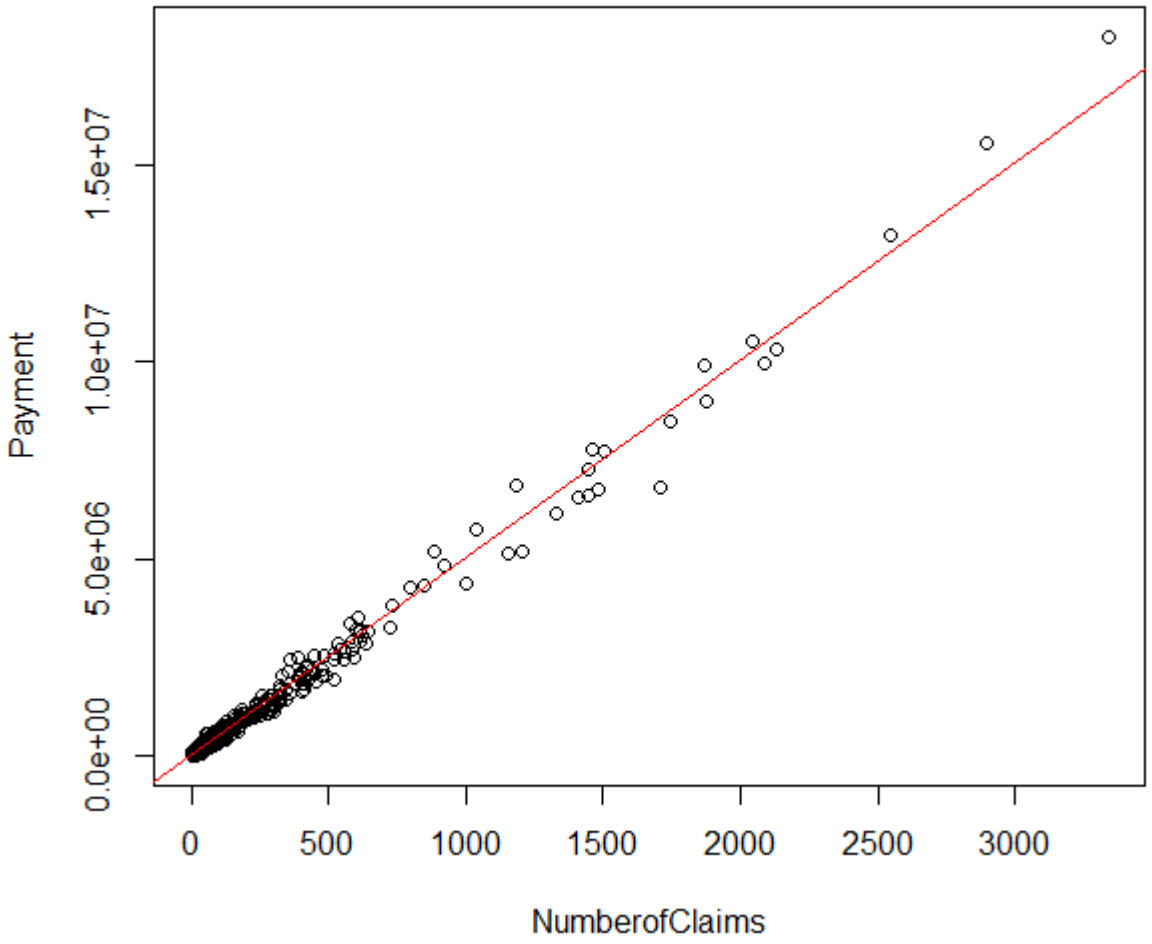
```
q3km<-
apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorInsurance$Kilometres,
mean))

q3km

plot(q3km)


q3bonus<-
apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorInsurance$Bonus,mean
))

q3bonus

plot(q3bonus)


cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Kilometres)

cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Zone)

cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Bonus)

cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Make)

cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Insured)


q4=lm(Claims~Kilometres+Zone+Bonus+Make+Insured,data=SwedishMotorInsurance)

summary(q4)
```

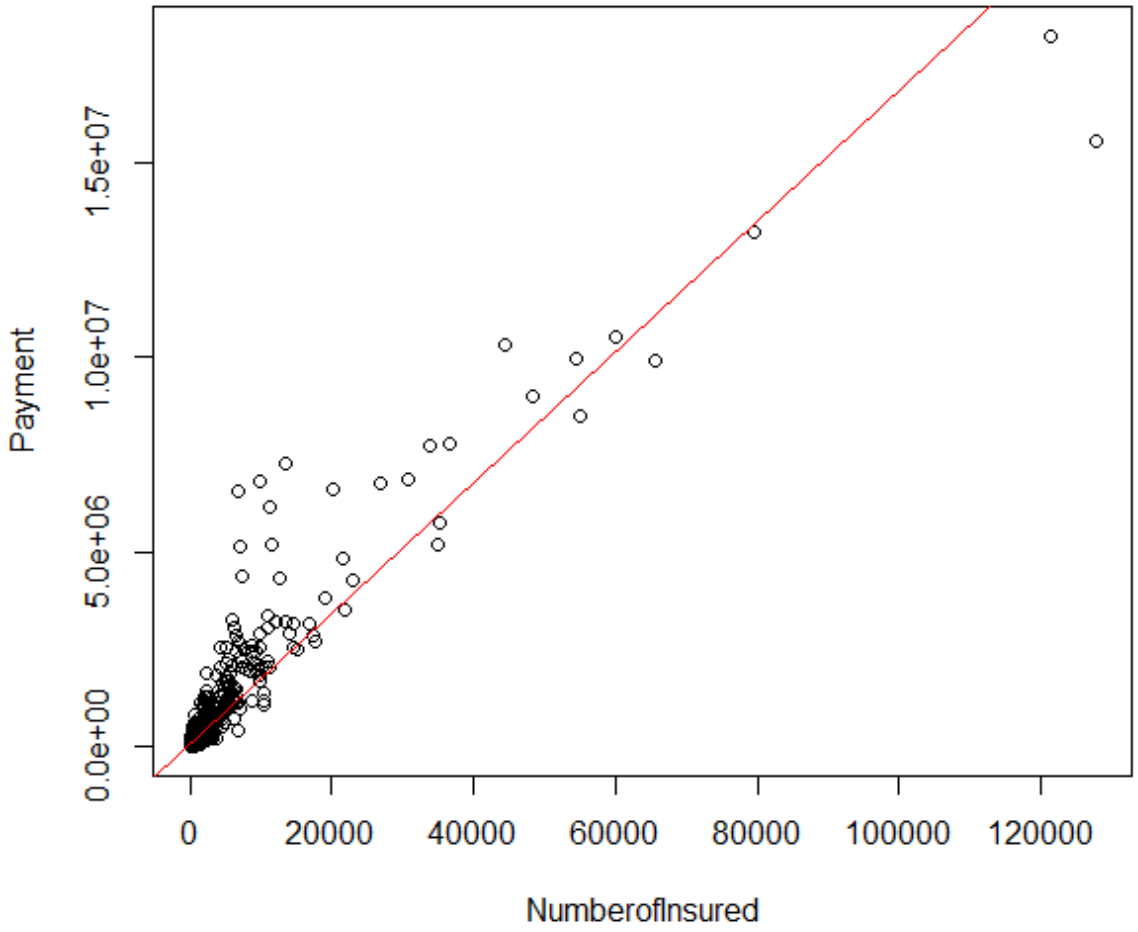
Outputs:

Question 1:

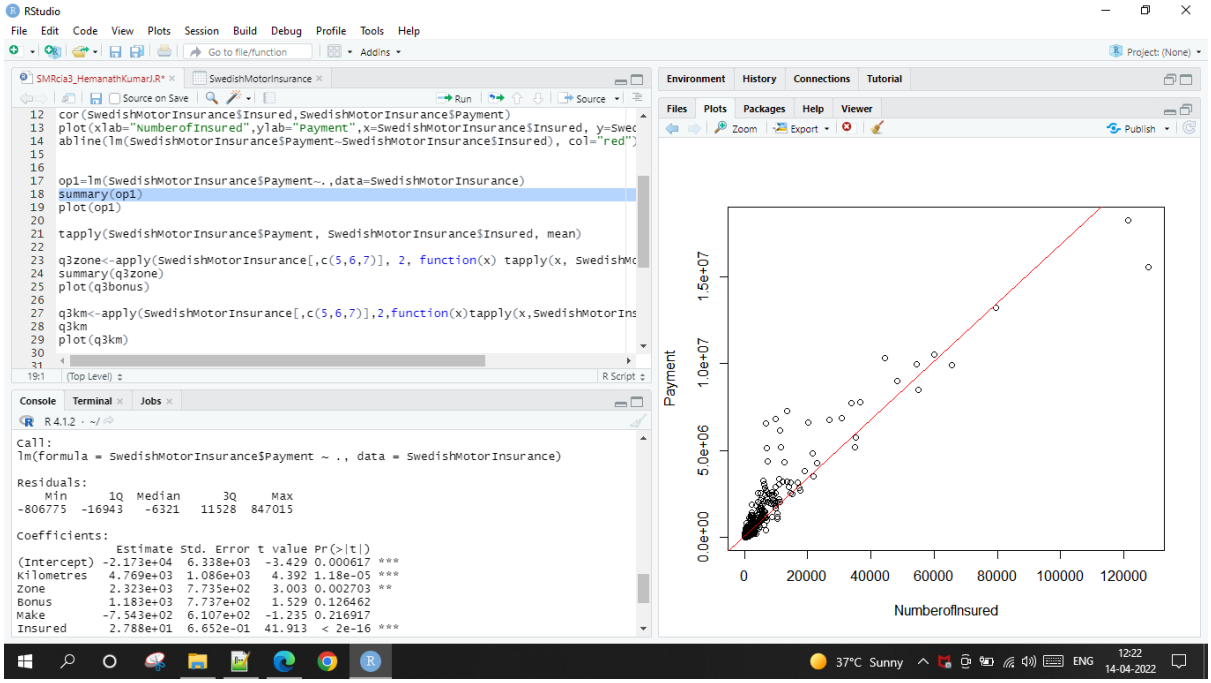


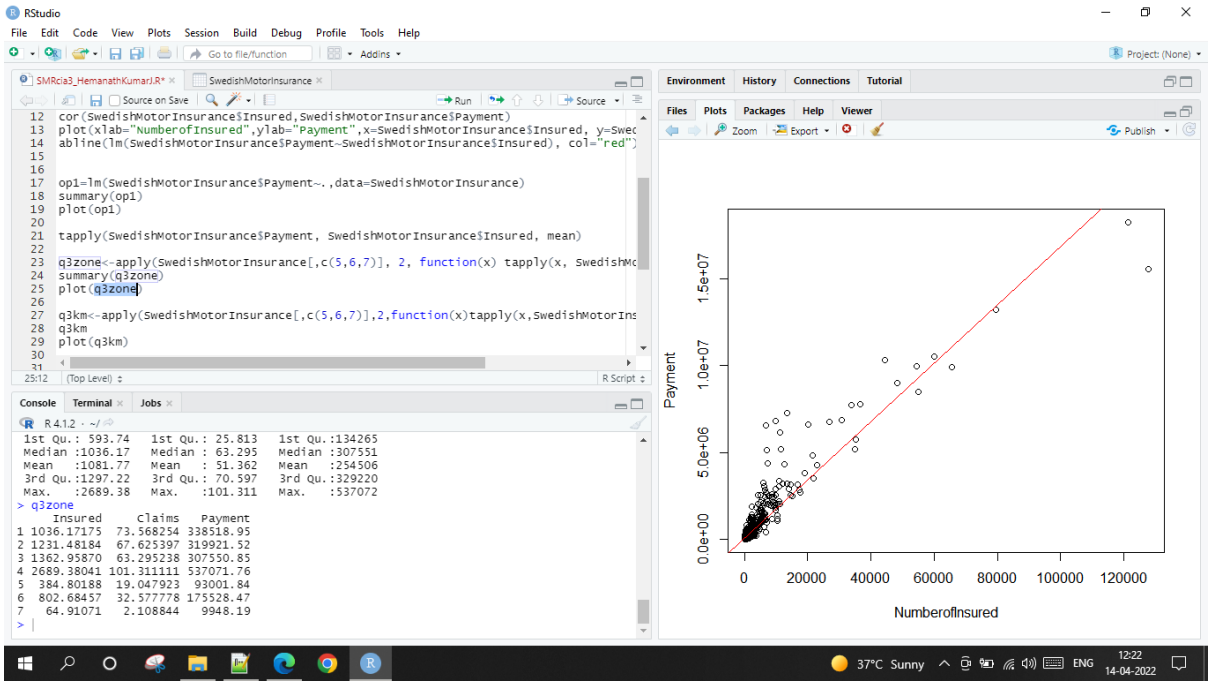
Question2:

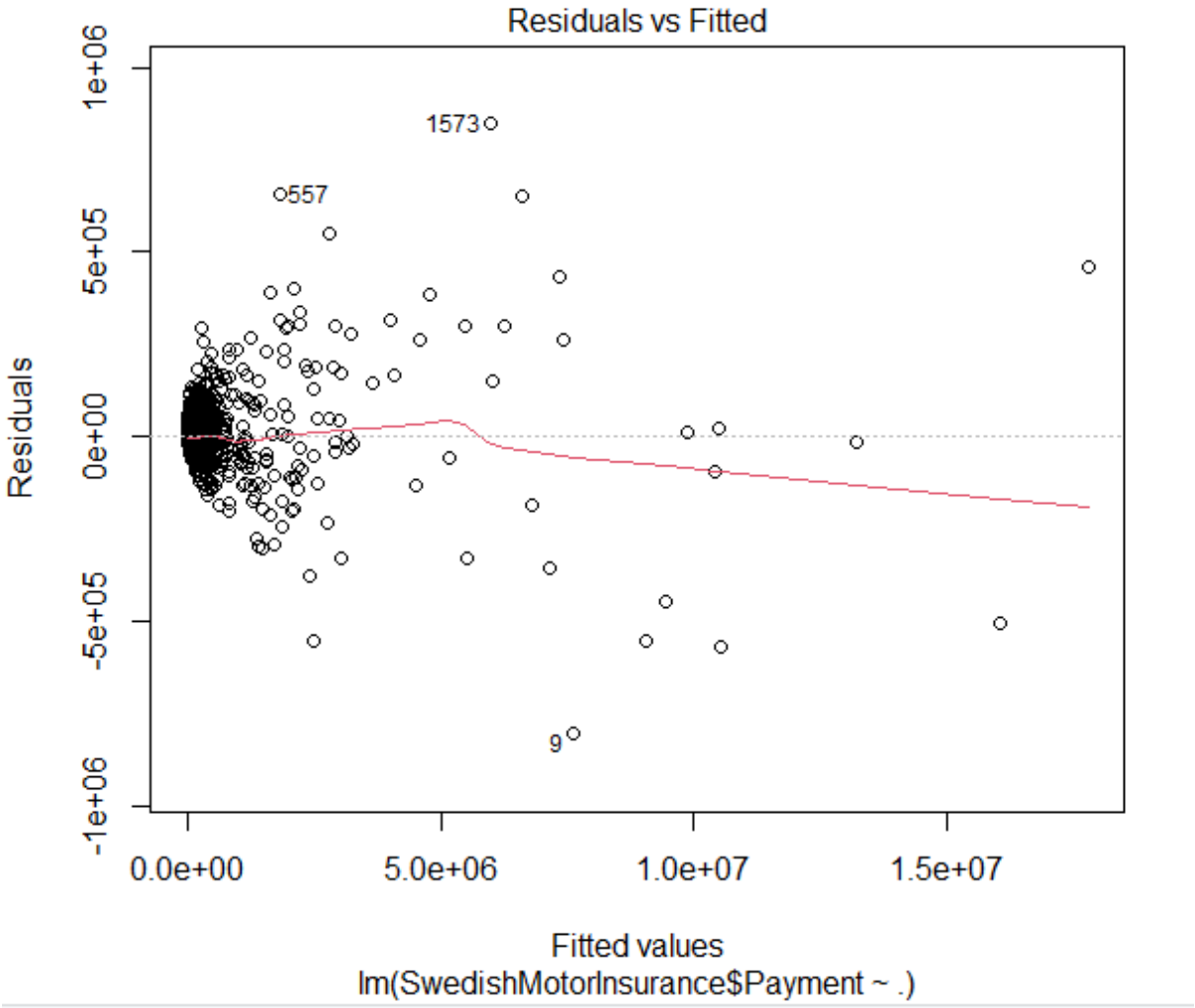

Payment
0.0e+00
5.0e+06
1.0e+07
1.5e+07
0
500
1000
1500
2000
2500
3000
NumberofClaims


Payment
0.0e+00
5.0e+06
1.0e+07
1.5e+07
0
20000
40000
60000
80000
100000
120000
NumberofInsured

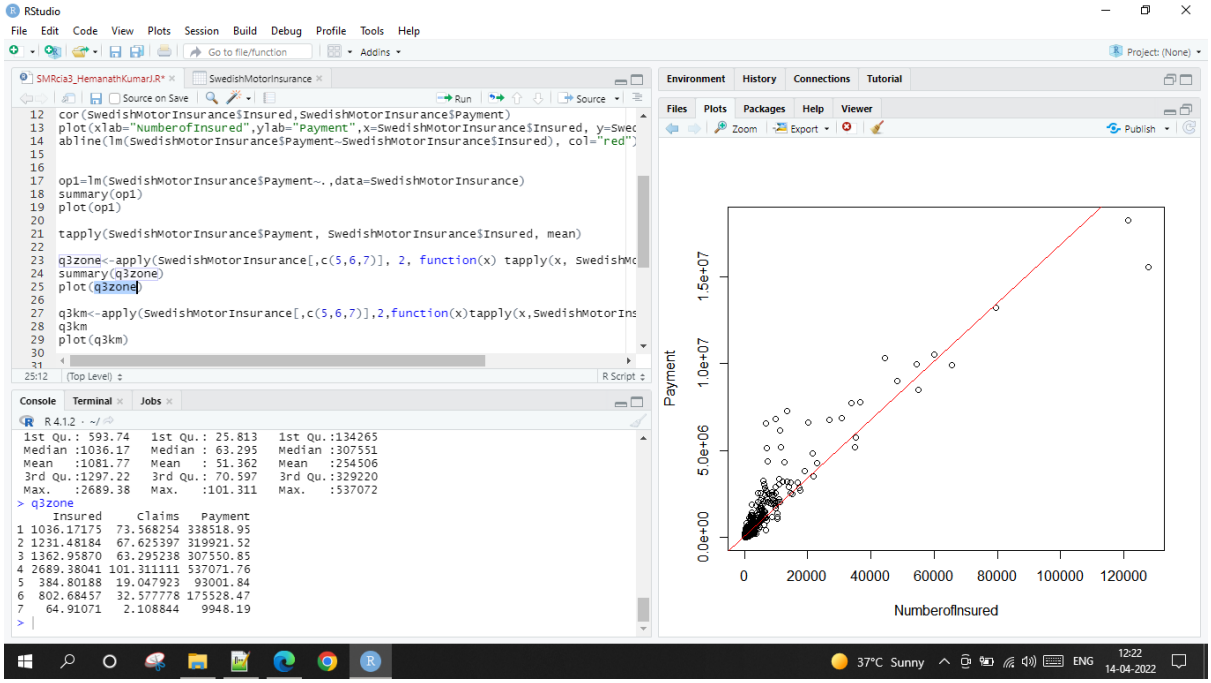
Question3:

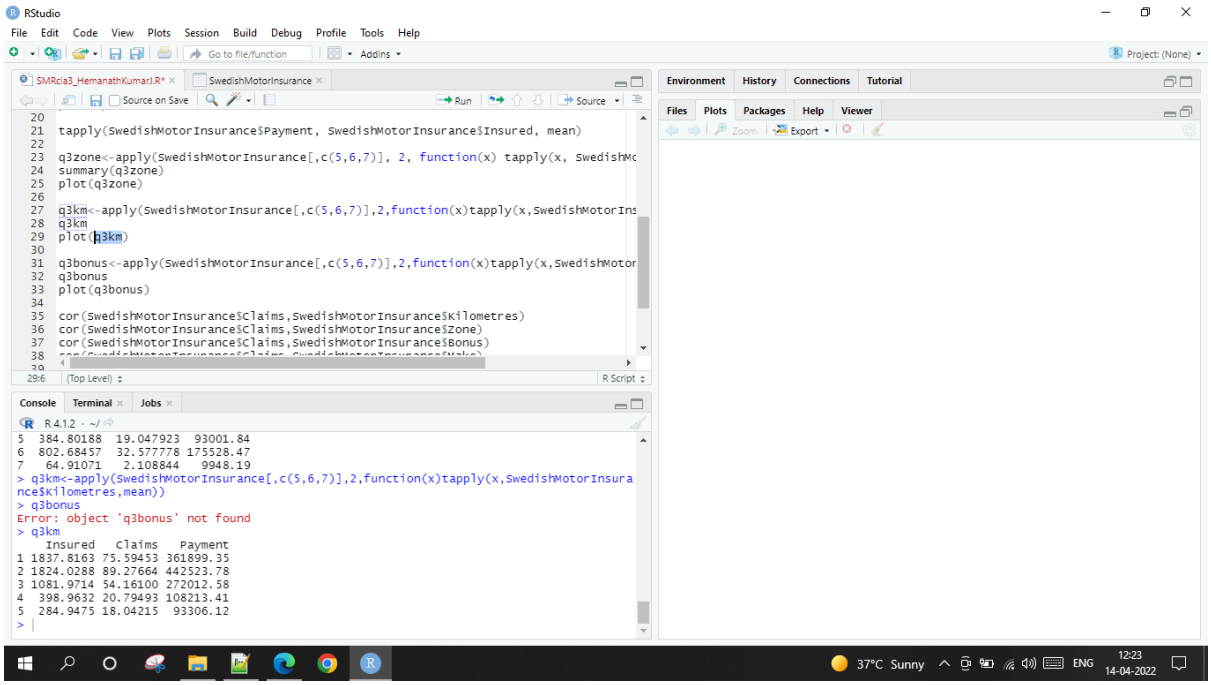

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
SMRcia3_HemanathKumarJ.R*
SwedishMotorInsurance
cor(SwedishMotorInsurance$Insured,SwedishMotorInsurance$Payment)
plot(xlab="NumberofInsured",ylab="Payment",x=SwedishMotorInsurance$Insured, y=Swed
abline(lm(SwedishMotorInsurance$Payment~SwedishMotorInsurance$Insured), col="red")
op1=lm(SwedishMotorInsurance$Payment~.,data=SwedishMotorInsurance)
summary(op1)
plot(op1)
tapply(SwedishMotorInsurance$Payment, SwedishMotorInsurance$Insured, mean)
q3zone<-apply(SwedishMotorInsurance[,c(5,6,7)], 2, function(x) tapply(x, SwedishMo
summary(q3zone)
plot(q3bonus)
q3km<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorIns
q3km
plot(q3km)
Console Terminal Jobs
Call:
lm(formula = SwedishMotorInsurance$Payment ~ ., data = SwedishMotorInsurance)
Residuals:
Min 1Q Median 3Q Max
-806775 -16943 -6321 11528 847015
Coefficients:
Estimate Std. Error t value Pr(>|t|)
(Intercept) -2.173e+04 6.338e+03 -3.429 0.000617 ***
Kilometres 4.769e+03 1.086e+03 4.392 1.18e-05 ***
Zone 2.323e+03 7.735e+02 3.003 0.002703 **
Bonus 1.183e+03 7.737e+02 1.529 0.126462
Make -7.543e+02 6.107e+02 -1.235 0.216917
Insured 2.788e+01 6.652e-01 41.913 < 2e-16 ***
Environment History Connections Tutorial
Files Plots Packages Help Viewer
Payment
NumberofInsured
0.0e+00
5.0e+06
1.0e+07
1.5e+07
0
20000
40000
60000
80000
100000
120000
37°C Sunny
ENG
12:22
14-04-2022

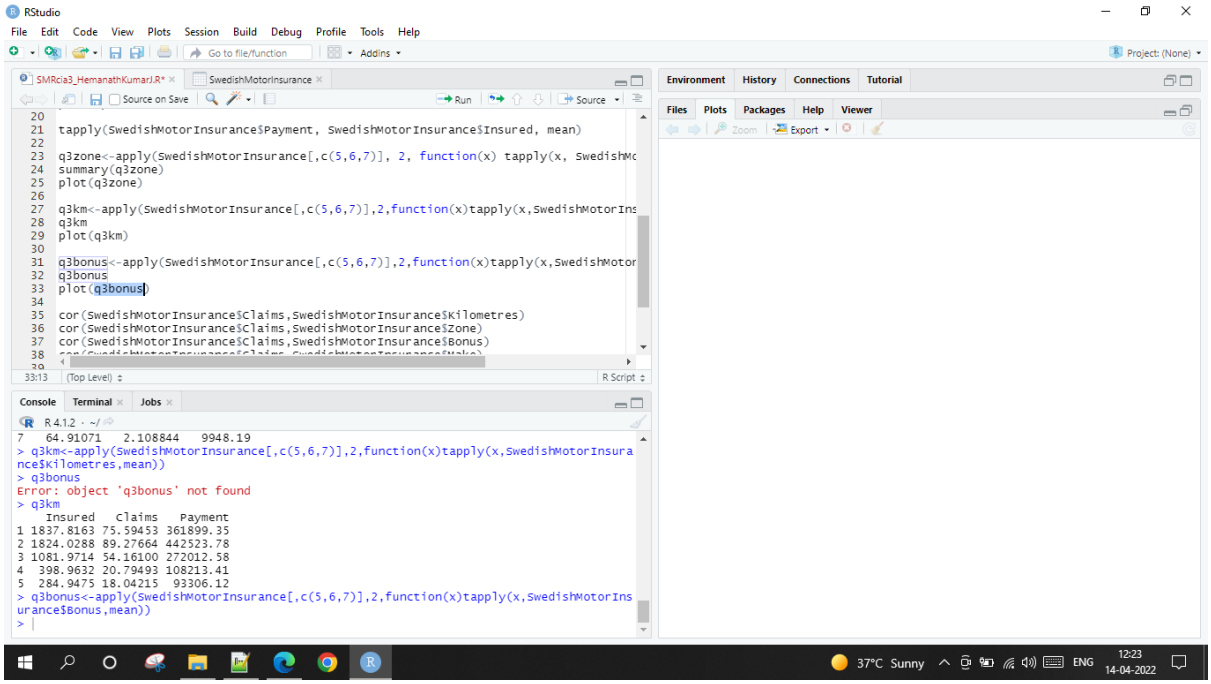

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
SMRcia3_HemanathKumarJ.R*
SwedishMotorInsurance
cor(SwedishMotorInsurance$Insured,SwedishMotorInsurance$Payment)
plot(xlab="NumberofInsured",ylab="Payment",x=SwedishMotorInsurance$Insured, y=Swed
abline(lm(SwedishMotorInsurance$Payment~SwedishMotorInsurance$Insured), col="red")
op1=lm(SwedishMotorInsurance$Payment~.,data=SwedishMotorInsurance)
summary(op1)
plot(op1)
tapply(SwedishMotorInsurance$Payment, SwedishMotorInsurance$Insured, mean)
q3zone<-apply(SwedishMotorInsurance[,c(5,6,7)], 2, function(x) tapply(x, SwedishMo
summary(q3zone)
plot(q3zone)
q3km<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorIns
q3km
plot(q3km)
Console Terminal Jobs
1st Qu.: 593.74 1st Qu.: 25.813 1st Qu.:134265
Median :1036.17 Median : 63.295 Median :307551
Mean :1081.77 Mean : 51.362 Mean :254506
3rd Qu.:1297.22 3rd Qu.: 70.597 3rd Qu.:329220
Max. :2689.38 Max. :101.311 Max. :537072
> q3zone
Insured Claims Payment
1 1036.17175 73.568254 338518.95
2 1231.48184 67.625397 319921.52
3 1362.95870 63.295238 307550.85
4 2689.38041 101.311111 537071.76
5 384.80188 19.047923 93001.84
6 802.68457 32.577778 175528.47
7 64.91071 2.108844 9948.19
Environment History Connections Tutorial
Files Plots Packages Help Viewer
Payment
NumberofInsured
0.0e+00
5.0e+06
1.0e+07
1.5e+07
0
20000
40000
60000
80000
100000
120000
37°C Sunny
ENG
12:22
14-04-2022


Residuals vs Fitted
Residuals
Fitted values
lm(SwedishMotorInsurance$Payment ~ .)
1e+06
5e+05
0e+00
-5e+05
-1e+06
0.0e+00
5.0e+06
1.0e+07
1.5e+07
1573
557
9

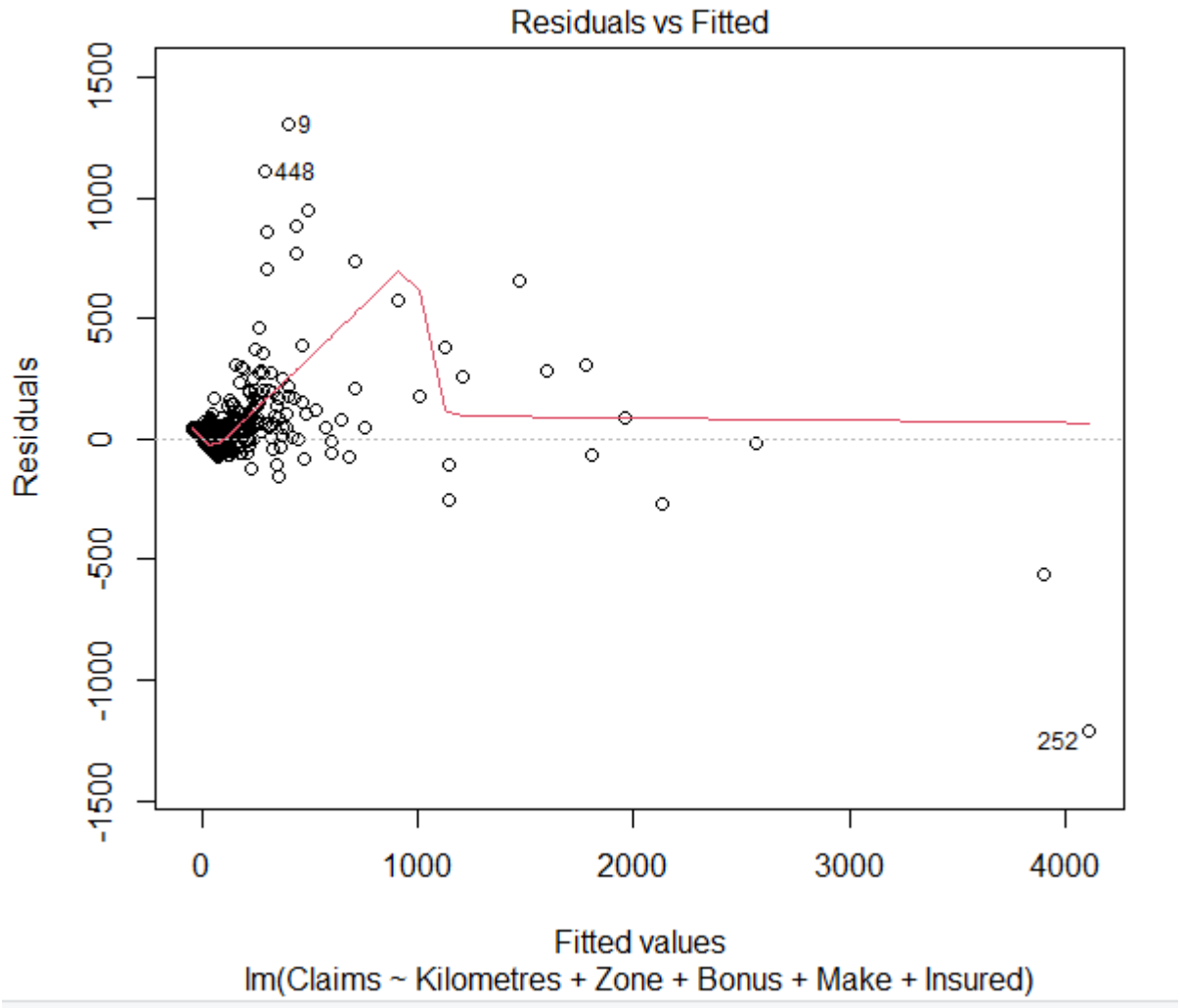
Question 4:


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
SMRcia3_HemanathKumarJ.R*
SwedishMotorInsurance
Source on Save
Run
Source
cor(SwedishMotorInsurance$Insured,SwedishMotorInsurance$Payment)
plot(xlab="NumberofInsured",ylab="Payment",x=SwedishMotorInsurance$Insured, y=Swed
abline(lm(SwedishMotorInsurance$Payment~SwedishMotorInsurance$Insured), col="red")
op1=lm(SwedishMotorInsurance$Payment~.,data=SwedishMotorInsurance)
summary(op1)
plot(op1)
tapply(SwedishMotorInsurance$Payment, SwedishMotorInsurance$Insured, mean)
q3zone<-apply(SwedishMotorInsurance[,c(5,6,7)], 2, function(x) tapply(x, SwedishMo
summary(q3zone)
plot(q3zone)
q3km<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorIns
q3km
plot(q3km)
25:12 (Top Level) R Script
Console Terminal Jobs
R 4.1.2 · ~/
1st Qu.: 593.74 1st Qu.: 25.813 1st Qu.:134265
Median :1036.17 Median : 63.295 Median :307551
Mean :1081.77 Mean : 51.362 Mean :254506
3rd Qu.:1297.22 3rd Qu.: 70.597 3rd Qu.:329220
Max. :2689.38 Max. :101.311 Max. :537072
> q3zone
Insured Claims Payment
1 1036.17175 73.568254 338518.95
2 1231.48184 67.625397 319921.52
3 1362.95870 63.295238 307550.85
4 2689.38041 101.311111 537071.76
5 384.80188 19.047923 93001.84
6 802.68457 32.577778 175528.47
7 64.91071 2.108844 9948.19
Environment History Connections Tutorial
Files Plots Packages Help Viewer
Zoom Export Publish
Payment
0.0e+00
5.0e+06
1.0e+07
1.5e+07
0
20000
40000
60000
80000
100000
120000
NumberofInsured
37°C Sunny
ENG
12:22
14-04-2022


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
SMRcia3_HemanathKumarJ.R*
SwedishMotorInsurance
tapply(SwedishMotorInsurance$Payment, SwedishMotorInsurance$Insured, mean)
q3zone<-apply(SwedishMotorInsurance[,c(5,6,7)], 2, function(x) tapply(x, SwedishMo
summary(q3zone)
plot(q3zone)
q3km<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorIns
q3km
plot(q3km)
q3bonus<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotor
q3bonus
plot(q3bonus)
cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Kilometres)
cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Zone)
cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Bonus)
29:6 (Top Level) R Script
Console Terminal Jobs
R 4.1.2 · ~/
5 384.80188 19.047923 93001.84
6 802.68457 32.577778 175528.47
7 64.91071 2.108844 9948.19
> q3km<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorInsura
nce$kilometres,mean))
> q3bonus
Error: object 'q3bonus' not found
> q3km
Insured Claims Payment
1 1837.8163 75.59453 361899.35
2 1824.0288 89.27664 442523.78
3 1081.9714 54.16100 272012.58
4 398.9632 20.79493 108213.41
5 284.9475 18.04215 93306.12
Environment History Connections Tutorial
Files Plots Packages Help Viewer
Zoom Export
37°C Sunny
ENG
12:23
14-04-2022


RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
SMRcia3_HemanathKumarJ.R*
SwedishMotorInsurance
Source on Save
Run
Source
tapply(SwedishMotorInsurance$Payment, SwedishMotorInsurance$Insured, mean)
q3zone<-apply(SwedishMotorInsurance[,c(5,6,7)], 2, function(x) tapply(x, SwedishMo
summary(q3zone)
plot(q3zone)
q3km<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorIns
q3km
plot(q3km)
q3bonus<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotor
q3bonus
plot(q3bonus)
cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Kilometres)
cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Zone)
cor(SwedishMotorInsurance$Claims,SwedishMotorInsurance$Bonus)
33:13 (Top Level) R Script
Console Terminal Jobs
R 4.1.2 · ~/
7 64.91071 2.108844 9948.19
> q3km<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorInsura
nce$Kilometres,mean))
> q3bonus
Error: object 'q3bonus' not found
> q3km
Insured Claims Payment
1 1837.8163 75.59453 361899.35
2 1824.0288 89.27664 442523.78
3 1081.9714 54.16100 272012.58
4 398.9632 20.79493 108213.41
5 284.9475 18.04215 93306.12
> q3bonus<-apply(SwedishMotorInsurance[,c(5,6,7)],2,function(x)tapply(x,SwedishMotorIns
urance$Bonus,mean))
>
Environment History Connections Tutorial
Files Plots Packages Help Viewer
Zoom Export
37°C Sunny
ENG
12:23
14-04-2022

Question 5:


Residuals vs Fitted
Residuals
Fitted values
lm(Claims ~ Kilometres + Zone + Bonus + Make + Insured)
9
448
252
1500
1000
500
0
-500
-1000
-1500
0
1000
2000
3000
4000