**Q.5 i) R Code**

data=matrix(c(112,38,89,70,130,50,127,75,178,80,210,77,150,68,150,80),4,4)

n<-ncol(data)

m<-mean(rowMeans(data))

s<-mean(apply(data,1,var))

v<-var(rowMeans(data))-mean(apply(data,1,var))/n

Z<-?

Z\*rowMeans(data)+(1-Z)\*m

**Q.5 iii) a) R code**

data= ? #as used in part ii

volume<-matrix(c(165,51,119,108,103,186,63,159,112,116,198,78,219,122,126,200,83,188,133,151),5,4)

n<-ncol(data)

N<-nrow(data)

X<-data/volume #claim payment per unit of volume measure

Xibar<-rowSums(data)/rowSums(volume)

Pi<-rowSums(volume) #volume measure for each insurer

P<-sum(Pi)

Pstar<-sum(Pi\*(1-Pi/P))/(N\*n-1)

m<-sum(data)/P #average claim payment per unit volume measure across all insurers

s<-mean(rowSums(volume\*(X-Xibar)^2)/(n-1))

v<-(sum(rowSums(volume\*(X-m)^2))/(n\*N-1)-s)/Pstar

zi<-? #credibility factor for each insurer

credibilityi<-zi\*Xibar+(1-zi)\*m #expected claim payment per unit of volume measure

volume5i<-matrix(c(210,91,192,144,181),5,1) #’volume5i’ is Year 5 volume measure

claims5i<-credibilityi\*volume5i #claims5i is the expected claim payment in year 5