```
#NUM 1

mtcars

#a

with(mtcars, tapply(mpg,cyl,mean))
with(mtcars, tapply(mpg,cyl,sd))
with(mtcars, tapply(mpg,cyl,var))

#b
library(ggplot2)

with(mtcars,plot(hp, mpg, col=cyl, pch=as.integer(cyl)))

with(mtcars, plot(hp, mpg, col=gear, pch=as.integer(gear)))

#c
with(mtcars, t.test(mpg~vs))
#p-value is 0.0001098. we can dismiss null hypothesis at 95% confidence interval
#평균이 다르다

#d

lm.mtcars<-with(mtcars, lm(hp~wt))

summary(lm.mtcars)

#NUM 2

airquality

#a

with(airquality, cor.test(Ozone, Solar.R))
#p-value: 0.0001793 so, we can dismiss null hypothesis at 95% confidence interval
#상관관계가 있다

#b
with(airquality, plot(Ozone, Solar.R, col=Month, pch=as.integer(Month)))
```

```
#c

airquality.Ozone5 <- airquality[airquality$Month==5 & is.na(airquality$Ozone)==F,]

airquality.Ozone5

airquality.Ozone8 <- airquality[airquality$Month==8 & is.na(airquality$Ozone)==F,]

airquality.Ozone8

with(airquality, t.test(airquality.Ozone5$Ozone,airquality.Ozone8$Ozone))
#p-value: 0.0002169/ we can dismiss null hypothesis at 95% confidence interval
#평균이 다르다


#NUM 19

library(ISwR)

alkfos

#a

with(alkfos, boxplot(c0~grp))
with(alkfos, boxplot(c24~grp))
with(alkfos, tapply(c24,grp,mean, na.rm=T))

#b

with(alkfos, var.test(c0~grp))
#p-value is 0.3465/ we can accept null hypothesis at 95% confidence interval
#등분산이다.

#c

with(alkfos, t.test(c0~grp))
#p-value is 0.5455/ we can accept null hypothesis at 95% confidence interval
#평균이 같다.


#NUM 23
```

```
intake

#a

diff<- c(intake$pre-intake$post)

intake.ex <- cbind(intake, diff)

intake.ex

#b

with(intake.ex, t.test(pre,post))
#p-value is 0.01629/ we can dismiss null hypothesis at 95% confidence interval
#평균이 다르다

#c

with(intake.ex,cor.test(pre,post,method = 'spearman') )
with(intake.ex,cor.test(pre,post,method = 'pearson') )
with(intake.ex,cor.test(pre,post,method = 'kendall') )
#for all methods, we can dismiss null hypothesis at 95% confidence interval
#상관관계가 있다.


#NUM 25

juul2

#a

juul2ex <- juul2[juul2$age>=12 & juul2$age <=18,]
juul2ex

#b

with(juul2ex, t.test(igf1~sex))
#p-value is 0.001476/ we can dismiss null hypothesis at 95% confidence interval
#평균이 다르다.
```

```
#c

lm.juul2ex<-with(juul2ex, lm(igf1~weight))

with(juul2ex, plot(weight,igf1))
abline(lm.juul2ex, col='red')

summary(lm.juul2ex)
```