

# Quetelet's Body Mass Index

## 작업환경 정리

- 현재 작업디렉토리 찾아보기

```
getwd()
```

```
## [1] "/Users/coop2711/Dropbox/works/class/Stat_Methods/R.WD"
```

- 검색가능한 package 와 data 열거

```
search()
```

```
## [1] ".GlobalEnv"      "package:knitr"    "package:stats"
## [4] "package:graphics" "package:grDevices" "package:utils"
## [7] "package:datasets" "KoreaEnv"
"package:methods"
## [10] "Autoloads"       "package:base"
```

## rn96.txt 자료 읽어들이고, 기초통계 요약하기

- rn96.txt 자료 읽어들이기, 원 자료를 보고 header 매개변수 추가

```
rn96<-read.table("rn96.txt",header=TRUE)
```

- rn96 의 자료구조 살펴기.

```
str(rn96)
```

```
## 'data.frame':   41 obs. of  2 variables:
## $ height: int  161 155 158 170 160 156 162 158 158 167 ...
## $ weight: int  50 49 42 65 60 52 58 46 45 51 ...
```

- height 와 weight 의 기초통계 살펴기

```
summary(rn96)
```

```
##      height      weight
## Min.   :150.0   Min.    :42.00
## 1st Qu.:156.0   1st Qu.:48.00
## Median :159.0   Median :52.00
## Mean   :159.3   Mean    :52.02
## 3rd Qu.:162.0   3rd Qu.:55.00
## Max.   :170.0   Max.    :65.00
```

- 평균과 표준편차만 살펴보려면

```
apply(rn96,2,mean)
```

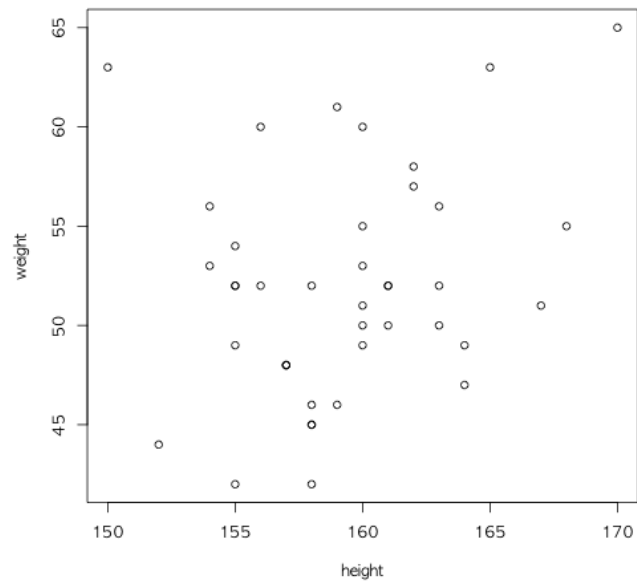
```
##      height      weight
## 159.26829   52.02439
```

```
apply(rn96,2,sd)
```

```
##      height      weight
## 4.266289   5.667838
```

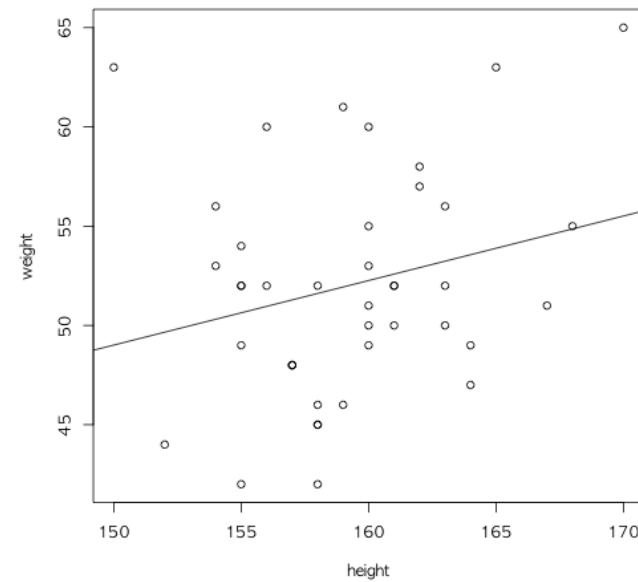
- height 와 weight 의 산점도 그리기

```
plot(weight~height, data=rn96)
```



- 선형회귀선 추가하기

```
plot(weight~height, data=rn96)
abline(lm(weight~height, data=rn96)$coefficient)
```



- 선형모형으로 분석하기

```
lm(weight~height, data=rn96)
```

```
##
## Call:
## lm(formula = weight ~ height, data = rn96)
##
## Coefficients:
## (Intercept)      height
##      0.2369      0.3252
```

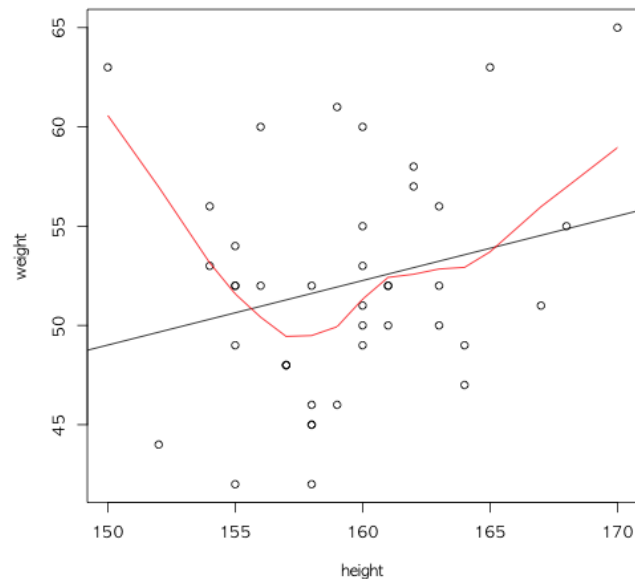
- 회귀계수와 관련 통계량 살펴보기

```
summary(lm(weight~height, data=rn96))
```

```
##
## Call:
## lm(formula = weight ~ height, data = rn96)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -9.6120 -3.2868 -0.5875  2.7622 13.9893
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   0.2369    32.8626   0.007   0.994
## height        0.3252     0.2063   1.576   0.123
##
## Residual standard error: 5.565 on 39 degrees of freedom
## Multiple R-squared:  0.0599, Adjusted R-squared:  0.0358
## F-statistic: 2.485 on 1 and 39 DF, p-value: 0.123
```

- lowess 회귀선 추가하기

```
plot(weight~height, data=rn96)
abline(lm(weight~height, data=rn96)$coefficient)
lines(lowess(rn96$height,rn96$weight),col="red")
```



- png 포맷으로 내보내기

```
png("rn-plot.png",height=640,width=640)
plot(weight~height, data=rn96)
abline(lm(weight~height, data=rn96)$coefficient)
lines(lowess(rn96$height,rn96$weight),col="red")
dev.off()
```

```
## quartz_off_screen
##                               2
```

## BMI 계산하고 줄기-잎 그리기

- 조금 편하게 작업하기 위해서

```
attach(rn96)
search()
```

```
## [1] ".GlobalEnv"      "rn96"             "package:knitr"
## [4] "package:stats"    "package:graphics" "package:grDevices"
## [7] "package:utils"    "package:datasets" "koreaEnv"
## [10] "package:methods" "Autoloads"        "package:base"
```

- BMI 공식은 몸무게/키<sup>2</sup>

```
rn96$BMI<-round(weight/(height/100)^2,digits=1)
head(rn96)
```

```
##   height weight  BMI
## 1   161     50  19.3
## 2   155     49  20.4
## 3   158     42  16.8
## 4   170     65  22.5
## 5   160     60  23.4
## 6   156     52  21.4
```

- 다음 작업이 왜 필요한지 생각해 볼 것.

```
detach(rn96)
attach(rn96)
```

- BMI 값들의 줄기-잎 그림 그리기

```
stem(BMI)
```

```
##
## The decimal point is at the |
##
## 16 | 855
## 18 | 00223480135555569
## 20 | 11478145667
## 22 | 1355146
## 24 | 17
## 26 |
## 28 | 0
```

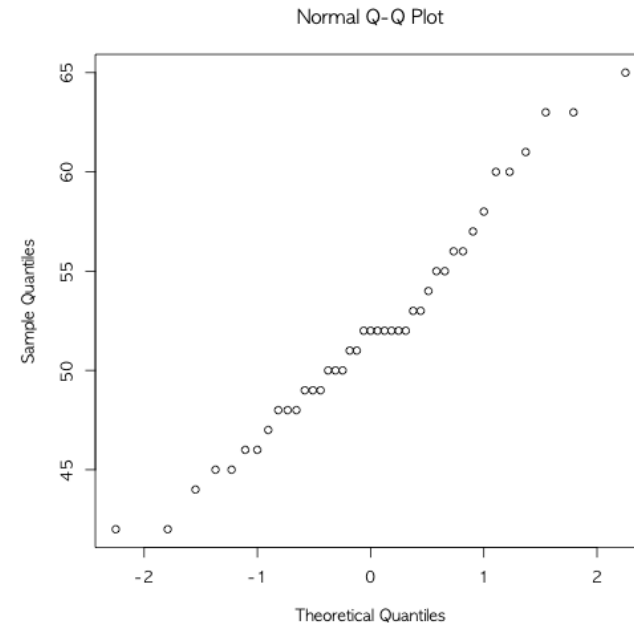
- 조금더 알아보기 쉽게 매개변수를 바꾸기

```
stem(BMI,scale=2)
```

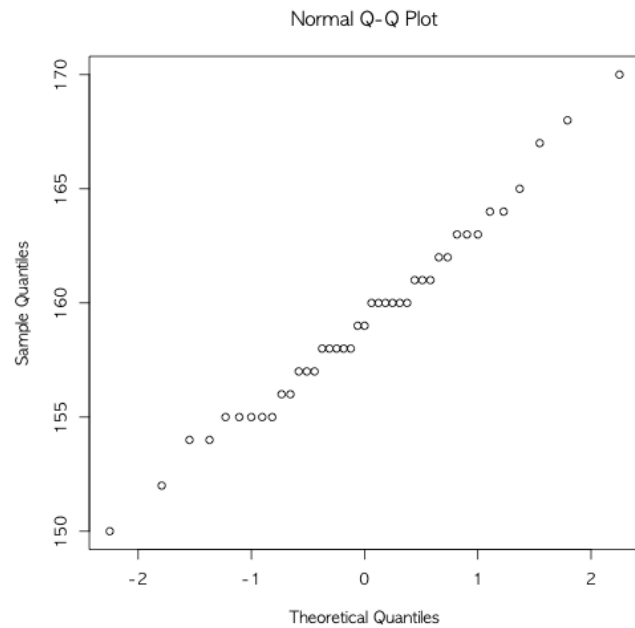
```
##
## The decimal point is at the |
##
## 16 | 8
## 17 | 55
## 18 | 0022348
## 19 | 0135555569
## 20 | 11478
## 21 | 145667
## 22 | 1355
## 23 | 146
## 24 | 17
## 25 |
## 26 |
## 27 |
## 28 | 0
```

- 각 변수는정규분포에 가까울까?

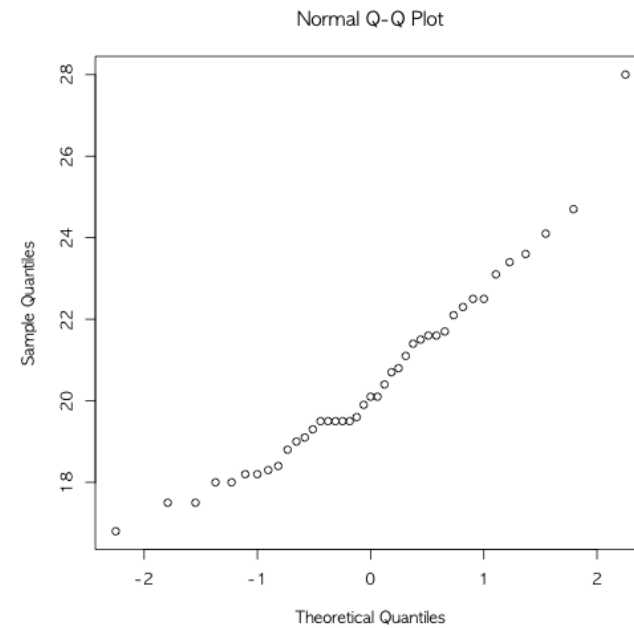
```
qqnorm(weight)
```



```
qqnorm(height)
```



```
qqnorm(BMI)
```



- weight와 height의 줄기-잎 그림

```
stem(weight)
```

```
##
## The decimal point is at the |
##
## 42 | 00
## 44 | 000
## 46 | 000
## 48 | 000000
## 50 | 00000
## 52 | 000000000
## 54 | 000
## 56 | 000
## 58 | 0
## 60 | 000
## 62 | 00
## 64 | 0
```

```
stem(height)
```

```
##
## The decimal point is at the |
##
## 150 | 0
## 152 | 0
## 154 | 0000000
## 156 | 00000
## 158 | 0000000
## 160 | 000000000
## 162 | 00000
## 164 | 000
## 166 | 0
## 168 | 0
## 170 | 0
```