HW3

Patrick Gardocki

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6-30

```r
octane = read.table("6-30.txt",header = TRUE)

octane=octane$Rating

o = sort(octane)

quantile(o, c(0.25,0.5,0.75),type=6)
```

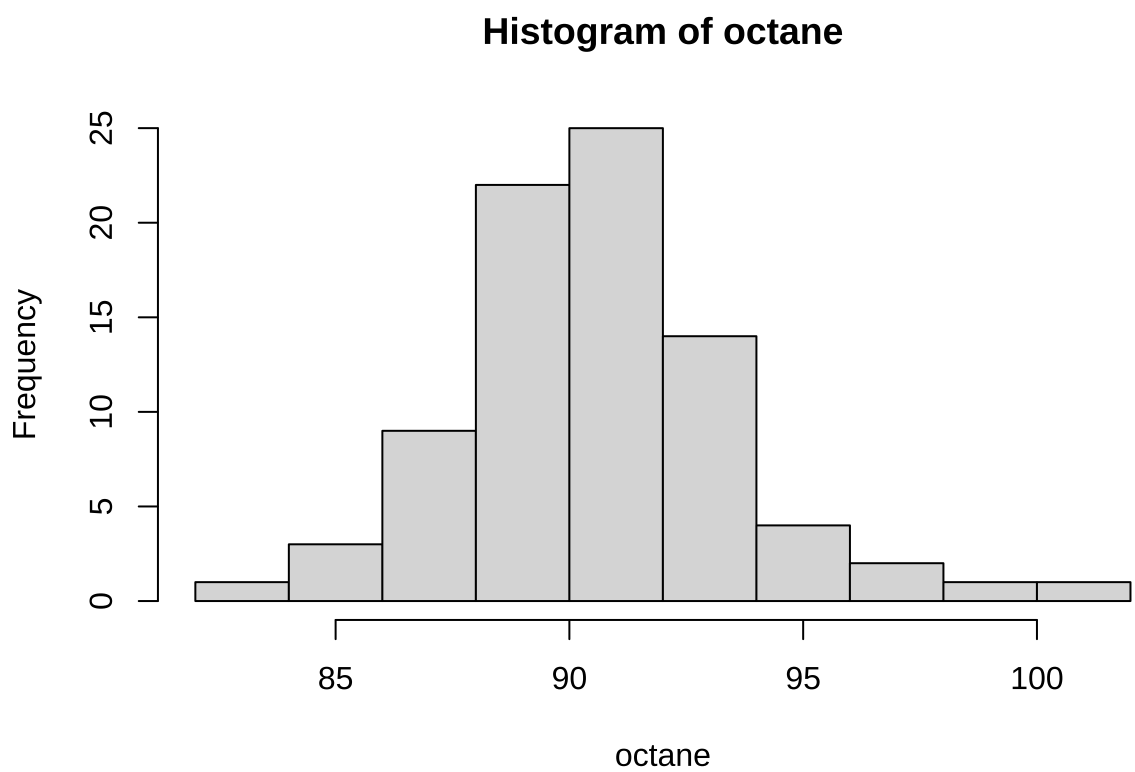
```
##    25%    50%    75%
## 88.575 90.400 92.200
```

```r
stem(octane, scale=2)
```

```
##
##   The decimal point is at the |
##
##    83 | 4
##    84 | 33
##    85 | 3
##    86 | 777
##    87 | 456789
##    88 | 23334556679
##    89 | 0233678899
##    90 | 0111344456789
##    91 | 0001112256688
##    92 | 22236777
##    93 | 023347
##    94 | 2247
##    95 |
##    96 | 15
##    97 |
##    98 | 8
##    99 |
##   100 | 3
```

6-46 REL DENSity is 1/2??????????

```
octane = read.table("6-30.txt",header = TRUE)

octane=octane$Rating

obj = hist(octane,breaks=8)
```




```
length(octane)
```

```
## [1] 82
```

```
library(knitr)
library(kableExtra)
df = data.frame(Frequency = obj$counts)

n=length(obj$breaks)
for(i in 1:(n-2)){
  df$Class[i]=paste(obj$breaks[i],"$\\le x <$", obj$breaks[i+1])
}

df$Class[n-1] = paste(obj$breaks[n-1],"$\\le x \\le$", obj$breaks[n])
```

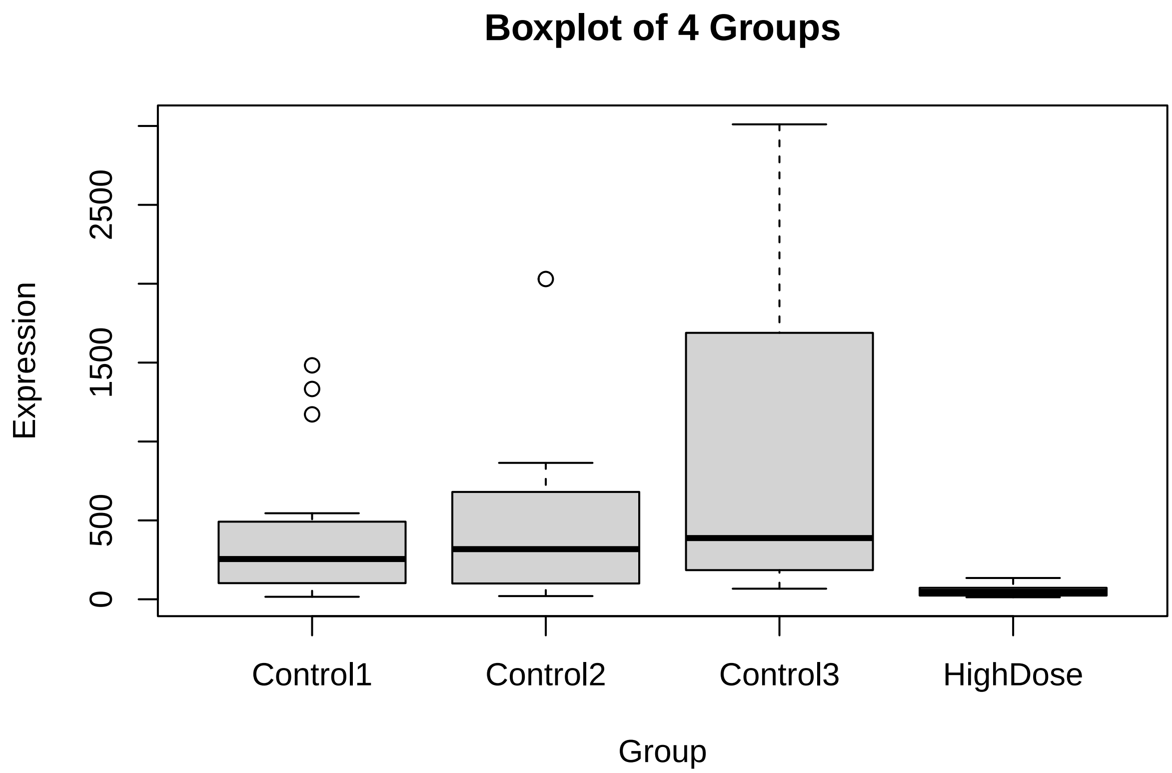
Table 1: Frecquency Distribution Table

Class	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
$82 \leq x < 84$	1	0.0121951	1	0.0121951219512195
$84 \leq x < 86$	3	0.0365854	4	0.0487804878048781
$86 \leq x < 88$	9	0.1097561	13	0.158536585365854
$88 \leq x < 90$	22	0.2682927	35	0.426829268292683
$90 \leq x < 92$	25	0.3048780	60	0.731707317073171
$92 \leq x < 94$	14	0.1707317	74	0.902439024390244
$94 \leq x < 96$	4	0.0487805	78	0.951219512195122
$96 \leq x < 98$	2	0.0243902	80	0.975609756097561
$98 \leq x < 100$	1	0.0121951	81	0.98780487804878
$100 \leq x \leq 102$	1	0.0121951	82	1

```
df$"Relative Frequency"= obj$density*2
for(i in 1:(n-1)){
  df$"Cumulative Frequency"[i]=paste(cumsum(obj$counts)[i])
  df$"Cumulative Relative Frequency"[i]=paste(cumsum(obj$density*2)[i])
}

kable(df[c(2,1,3,4,5)], "latex", align="c", caption="Frecquency Distribution Table", escape = FALSE)
```

6-81

```
Expr = read.table("6-81.txt",header = TRUE)

attach(Expr)

boxplot(Expression~Group, main="Boxplot of 4 Groups",
   xlab="Group", ylab="Expression")
```



The control groups seem to have the same median value but drastically different variances. The 'high dose' group has a mush smaller variance and slightly lower median expression as well.

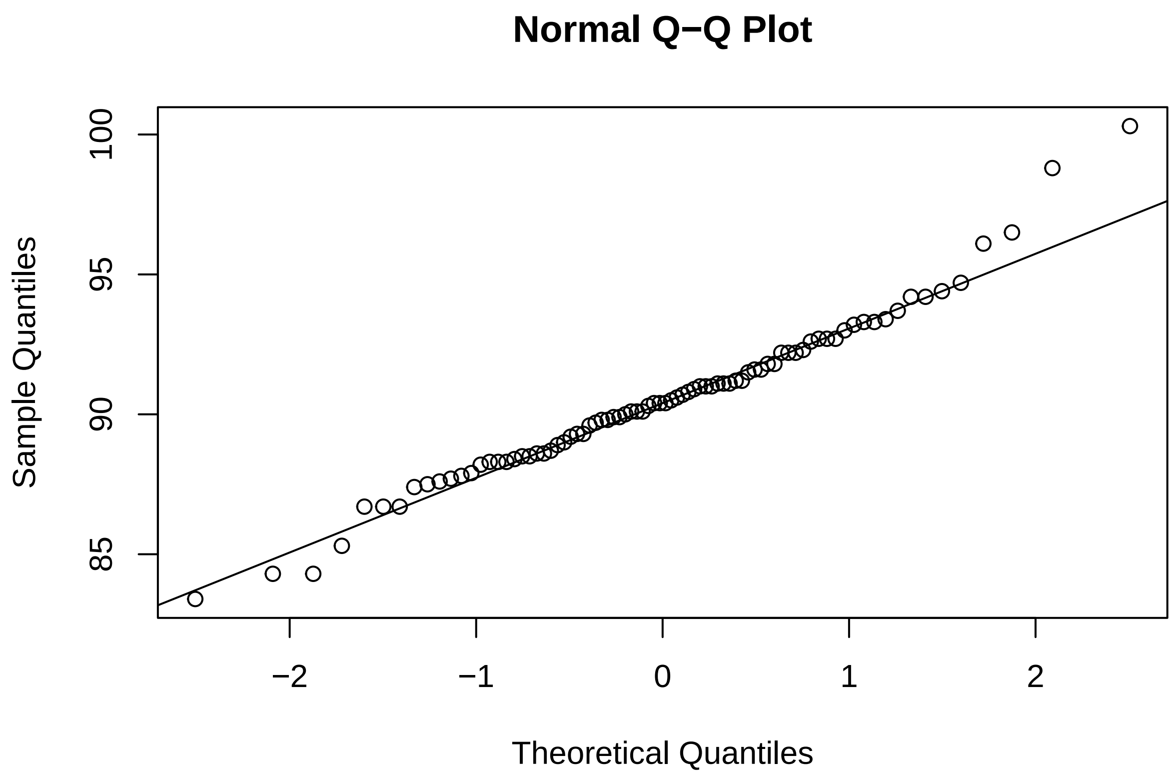
6-98

```
octane = read.table("6-30.txt",header = TRUE)

octane=octane$Rating
qqnorm(octane,datex=TRUE)
```

```
## Warning in plot.window(...): "datex" is not a graphical parameter

## Warning in plot.xy(xy, type, ...): "datex" is not a graphical parameter

## Warning in axis(side = side, at = at, labels = labels, ...): "datex" is not a
## graphical parameter

## Warning in axis(side = side, at = at, labels = labels, ...): "datex" is not a
## graphical parameter

## Warning in box(...): "datex" is not a graphical parameter

## Warning in title(...): "datex" is not a graphical parameter
```

```
qqline(octane,datex=TRUE)
```

```
## Warning in int_abline(a = a, b = b, h = h, v = v, untf = untf, ...): "datex" is
## not a graphical parameter
```



The Normal Probability plot suggests that the data is normally distributed but seems to break down at both ends of the data range.

7-12

$\mu_X = 8.2\ minutes,\ n = 49,\ \sigma_X = 1.5\ minutes,\ \sigma_{\bar{x}} = \frac{\sigma_X}{\sqrt{n}} = 0.2143$ Under Central Limit Theorem, $\bar{X}$ is approx. normally distributed.

(a)

$P(\bar{X} < 10) = P(Z < \frac{10-\mu}{\sigma_{\bar{X}}}) = P(Z < 8.4) = 1$

(b)

$P(5 < \bar{X} < 10) = P(\frac{5-\mu}{\sigma_{\bar{X}}} < Z < \frac{10-\mu}{\sigma_{\bar{X}}}) = P(Z < 8.4) - P(Z < -14.932) = 1 - 0 = 1$

(c)

$P(\bar{X} < 6) = P(Z < \frac{6-\mu}{\sigma_{\bar{X}}}) = P(Z < -10.27) = 0$

7-37

7-44

8-1

8-41

8-53