Homework 01

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Homework for July 6th

Solution for Exercise 1

a.

```
iowa.df <- read.csv("Data/iowa.csv",header = T,sep=";")
```

b.

```
dim(iowa.df)
```

```
## [1] 33 10
```

c.

```
colnames(iowa.df)
```

```
##  [1] "Year"  "Rain0" "Temp1" "Rain1" "Temp2" "Rain2" "Temp3" "Rain3" "Temp4"
## [10] "Yield"
```

d.

```
iowa.df[5,7]
```

```
## [1] 79.7
```

e.

```
iowa.df[2,]
```

```
##   Year Rain0 Temp1 Rain1 Temp2 Rain2 Temp3 Rain3 Temp4 Yield
## 2 1931 14.76  57.5  3.83    75  2.72  77.2   3.3  72.6  32.9
```

Solution for Exercise 2

a.

```
vector1 <- c("5", "12", "7", "32")
max(vector1)
```

```
## [1] "7"
```

```
sort(vector1)
```

```
## [1] "12" "32" "5"  "7"
```

```
#sum(vector1)
```

The first computation can lead out to results, while the last two can not. The reason is that vector1 consists of 4 character variable, but the sort and sum can only sort or add up the numbers rather than the characters. The following codes will do.

```
vec1 <-c(5,12,7,32)
max(vec1)
```

```
## [1] 32
```

```
sort(vec1)
```

```
## [1]  5  7 12 32
```

```
sum(vec1)
```

```
## [1] 56
```

b.

```
vector2 <- c("5",7,12)
#vector2[2] + vector2[3]

dataframe3 <- data.frame(z1="5",z2=7,z3=12)
dataframe3[1,2] + dataframe3[1,3]
```

```
## [1] 19
```

```
list4 <- list(z1="6", z2=42, z3="49", z4=126)
list4[[2]]+list4[[4]]
```

```
## [1] 168
```

```
#list4[2]+list4[4]
```

The first question is that the type of vector2 is

```
typeof(vector2)
```

```
## [1] "character"
```

as a resulr of which can not be added up. the summation can only work for numbers as follows:

```
vec2 <- c(5,7,12)
vec2[2] + vec2[3]
```

```
## [1] 19
```

Second, function data.frame creates coupled collections of variables like lists or matrices, which in that way makes the summation available. Last, [] and [[]] are used to access elements in a list: [] gain access the name and the value, while [[]] gain access to only the number. So list4[[2]]+list4[[4]] returns a nummber of 168 while the other returns an error.

Solution for Exercise 3

a.

```
seq(1,10000,by=372)
```

```
##  [1]    1  373  745 1117 1489 1861 2233 2605 2977 3349 3721 4093 4465 4837 5209
## [16] 5581 5953 6325 6697 7069 7441 7813 8185 8557 8929 9301 9673
```

```
  seq(1,10000,length.out=50)
```

```
##  [1]     1.0000   205.0612   409.1224   613.1837   817.2449  1021.3061
##  [7]  1225.3673  1429.4286  1633.4898  1837.5510  2041.6122  2245.6735
## [13]  2449.7347  2653.7959  2857.8571  3061.9184  3265.9796  3470.0408
## [19]  3674.1020  3878.1633  4082.2245  4286.2857  4490.3469  4694.4082
## [25]  4898.4694  5102.5306  5306.5918  5510.6531  5714.7143  5918.7755
## [31]  6122.8367  6326.8980  6530.9592  6735.0204  6939.0816  7143.1429
## [37]  7347.2041  7551.2653  7755.3265  7959.3878  8163.4490  8367.5102
## [43]  8571.5714  8775.6327  8979.6939  9183.7551  9387.8163  9591.8776
## [49]  9795.9388 10000.0000
```

b.

```
rep(1:3, times=3)
```

```
## [1] 1 2 3 1 2 3 1 2 3
```

```
rep(1:3, each=3)
```

```
## [1] 1 1 1 2 2 2 3 3 3
```

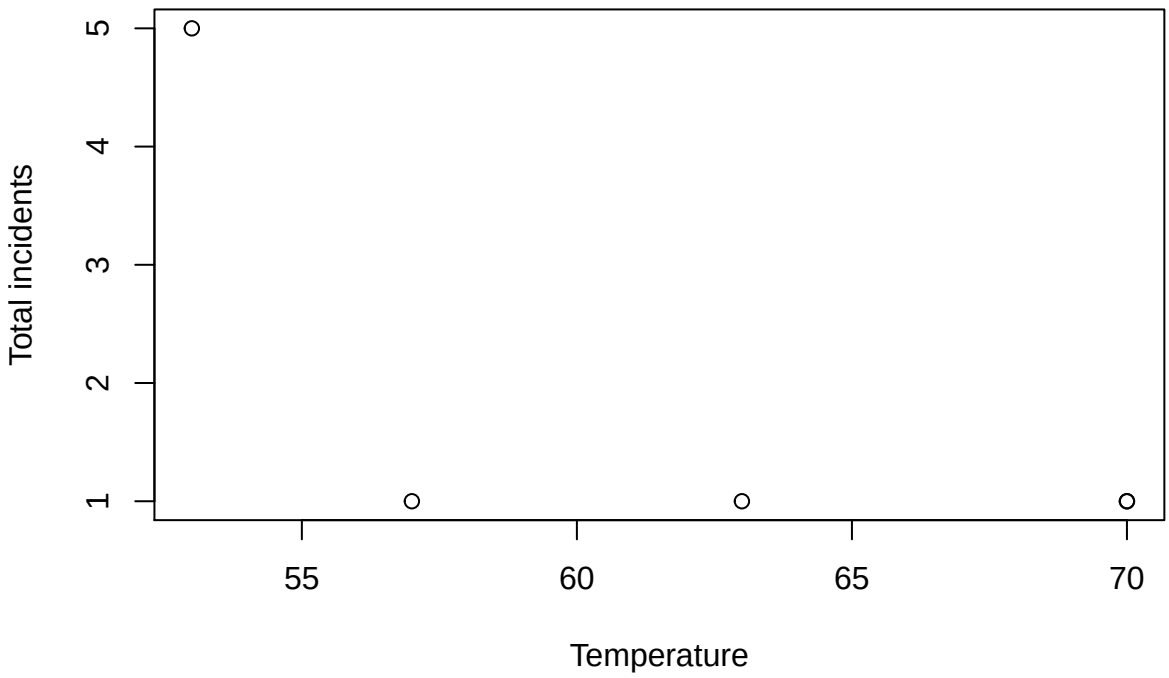
The first one repeats the sequence from 1 to 3 for three times while the second one repeats each elements for three times inside the sequence.

Solution for MB.Ch1.2

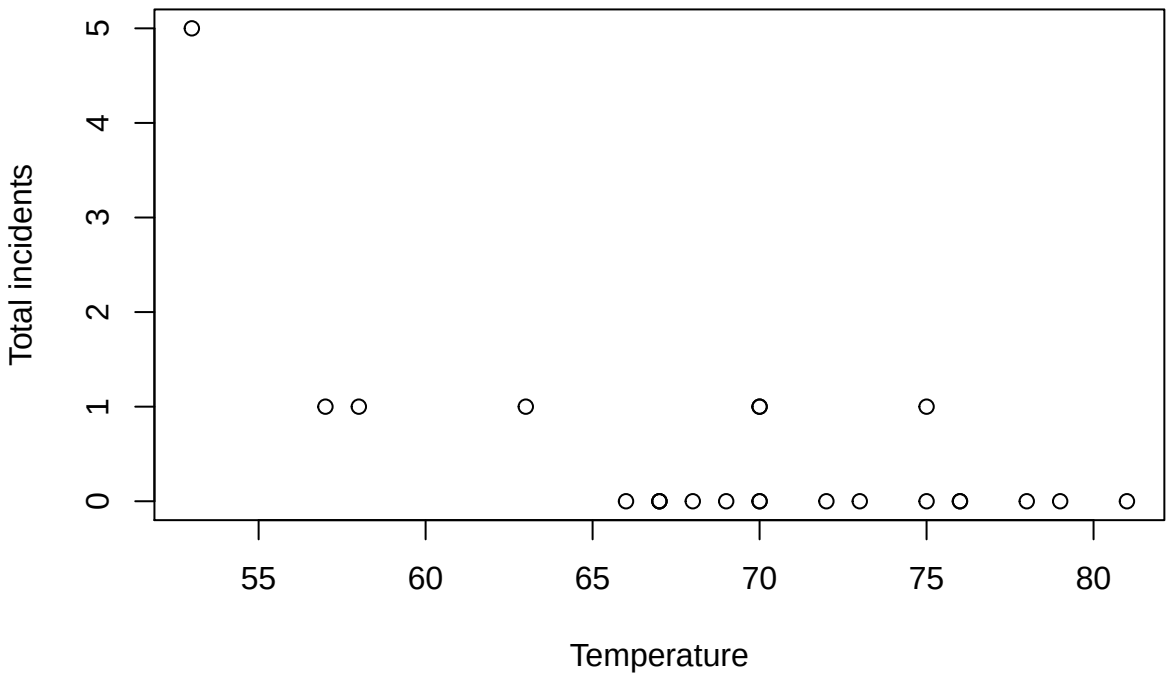
```
  library(DAAG)
```

```
## Loading required package: lattice
```

```
  orings <- DAAG::orings
  dataframe1 <- orings[c(1,2,4,11,13),]
  plot(dataframe1[,1],dataframe1[,4],xlab = "Temperature",ylab = "Total incidents")
```




```
plot(orings[,1],orings[,4],xlab = "Temperature",ylab = "Total incidents")
```



Solution for MB.Ch1.4

a.

```
ais <- DAAG::ais
str(ais)
```

```
## 'data.frame':    202 obs. of  13 variables:
##  $ rcc   : num  3.96 4.41 4.14 4.11 4.45 4.1 4.31 4.42 4.3 4.51 ...
##  $ wcc   : num  7.5 8.3 5 5.3 6.8 4.4 5.3 5.7 8.9 4.4 ...
##  $ hc    : num  37.5 38.2 36.4 37.3 41.5 37.4 39.6 39.9 41.1 41.6 ...
##  $ hg    : num  12.3 12.7 11.6 12.6 14 12.5 12.8 13.2 13.5 12.7 ...
##  $ ferr  : num  60 68 21 69 29 42 73 44 41 44 ...
##  $ bmi   : num  20.6 20.7 21.9 21.9 19 ...
##  $ ssf   : num  109.1 102.8 104.6 126.4 80.3 ...
##  $ pcBfat: num  19.8 21.3 19.9 23.7 17.6 ...
##  $ lbm   : num  63.3 58.5 55.4 57.2 53.2 ...
##  $ ht    : num  196 190 178 185 185 ...
##  $ wt    : num  78.9 74.4 69.1 74.9 64.6 63.7 75.2 62.3 66.5 62.9 ...
##  $ sex   : Factor w/ 2 levels "f","m": 1 1 1 1 1 1 1 1 1 1 ...
##  $ sport : Factor w/ 10 levels "B_Ball","Field",..: 1 1 1 1 1 1 1 1 1 1 ...
```

```
sum(is.na(ais))
```

```
## [1] 0
```

b.

```
table <- table(ais$sex,ais$sport)
table
```

```
##
##     B_Ball Field Gym Netball Row Swim T_400m T_Sprnt Tennis W_Polo
##   f     13     7   4      23  22    9     11       4      7      0
##   m     12    12   0       0  15   13     18      11      4     17
```

```
ratio = table[1,]/table[2,]
names(ratio[(ratio>2) | (ratio<1/2)])
```

```
## [1] "Gym"     "Netball" "T_Sprnt" "W_Polo"
```

Solution for MB.Ch1.6

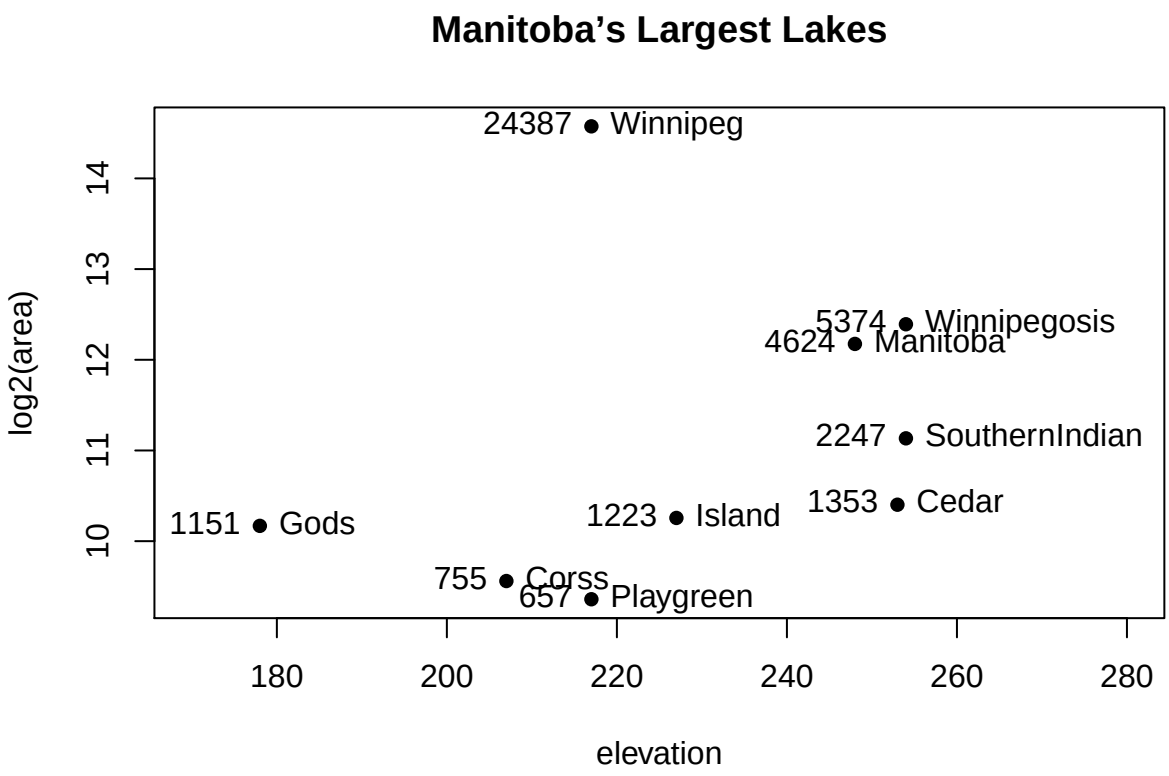
```
elevation <- c(217, 254,248,254,253,227,178,207,217)
area <- c(24387,5374,4624,2247,1353,1223,1151,755,657)
names <- c("Winnipeg","Winnipegosis","Manitoba","SouthernIndian","Cedar","Island","Gods","Corss","Playg
Manitoba.lakes <- data.frame("elevatoin"=elevation,"area"=area)
row.names(Manitoba.lakes) <- names
```

a.

```
attach(Manitoba.lakes)
```

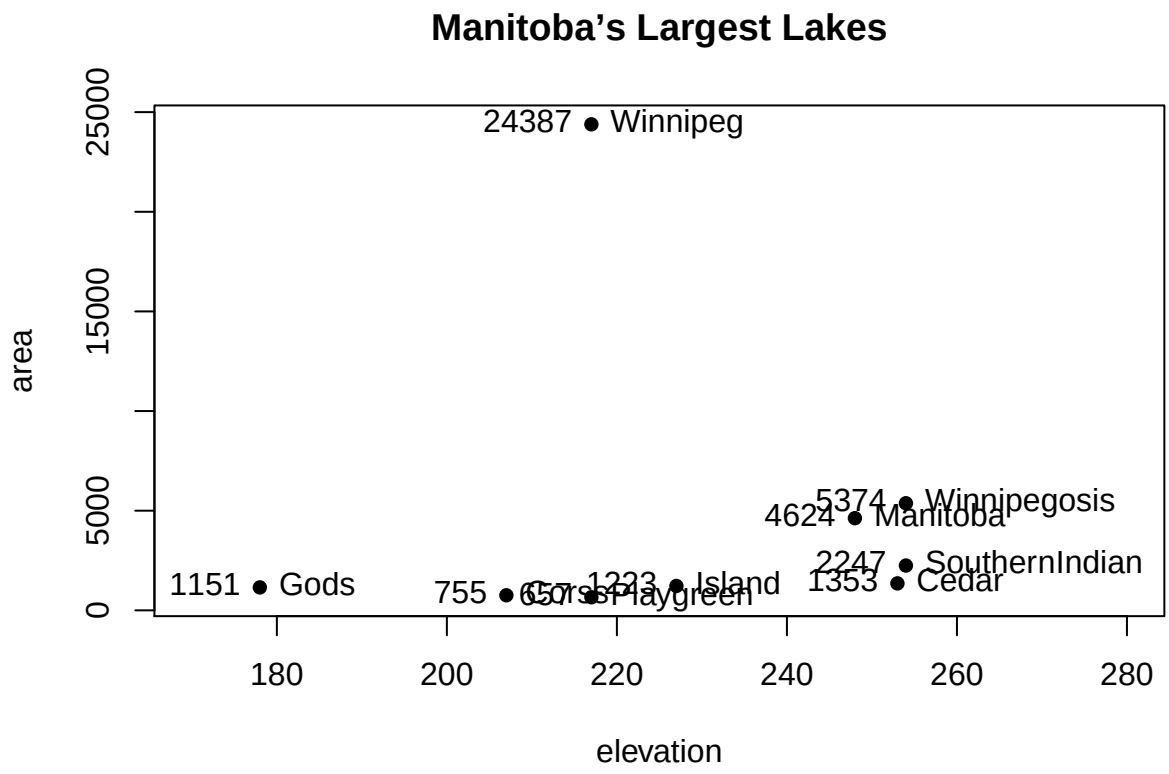
```
## The following object is masked _by_ .GlobalEnv:
##
##     area
```

```
plot(log2(area) ~ elevation, pch=16, xlim=c(170,280))
# NB: Doubling the area increases log2(area) by 1.0
text(log2(area) ~ elevation, labels=row.names(Manitoba.lakes), pos=4)
text(log2(area) ~ elevation, labels=area, pos=2)
title("Manitoba's Largest Lakes")
```



b.

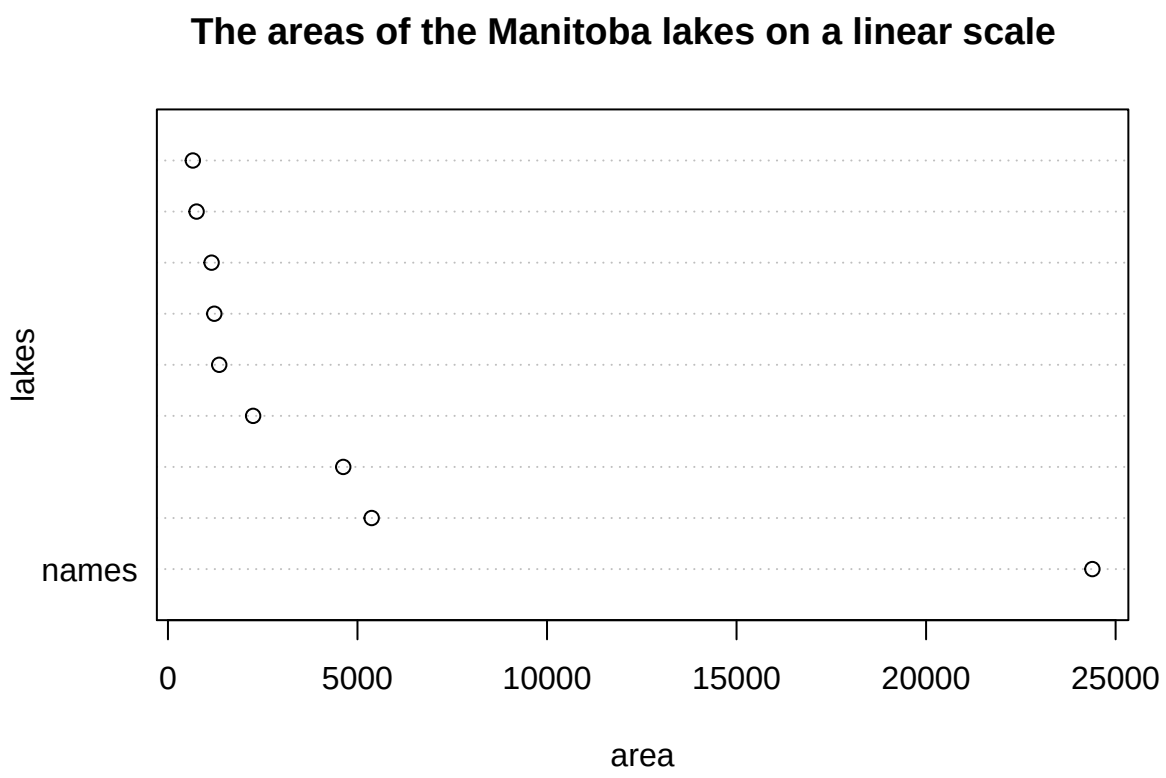
```
plot(area ~ elevation, pch=16, xlim=c(170,280), ylog=T)
text(area ~ elevation, labels=row.names(Manitoba.lakes), pos=4, ylog=T)
text(area ~ elevation, labels=area, pos=2, ylog=T)
title("Manitoba's Largest Lakes")
```



Solution for MB.Ch1.7

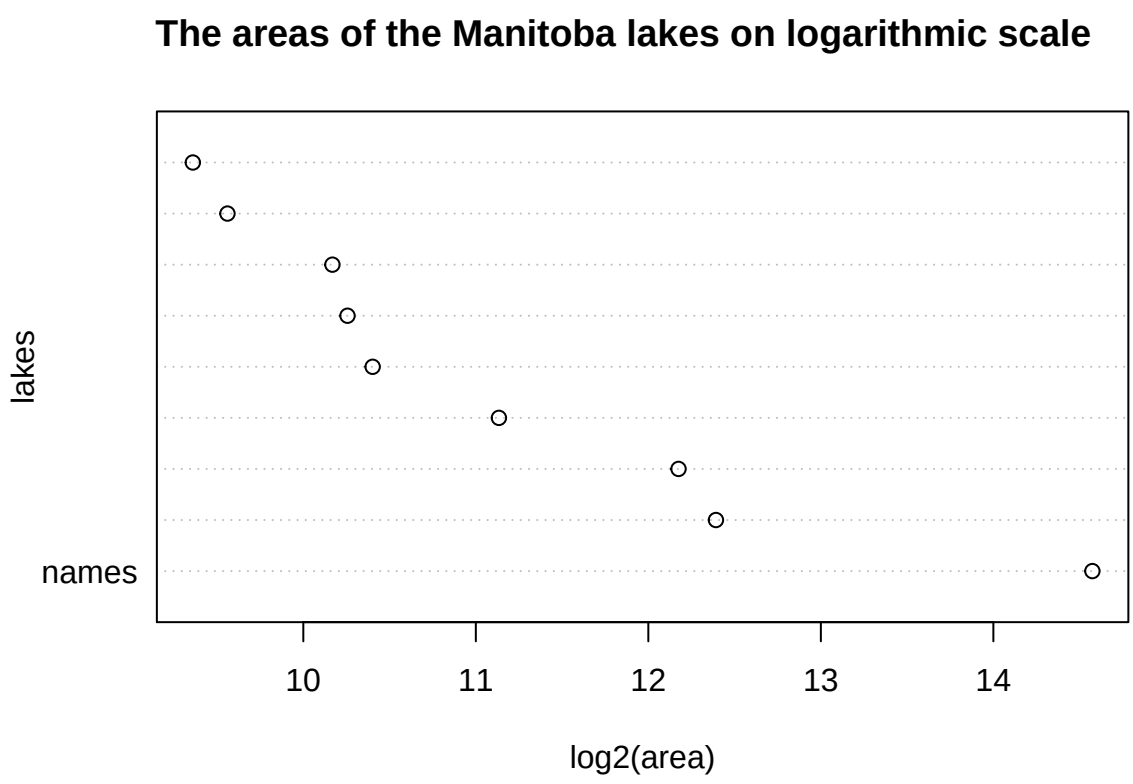
a.

```
dotchart(area,xlab="area",ylab="lakes",labels="names")
title("The areas of the Manitoba lakes on a linear scale")
```



b.

```
dotchart(log2(area),xlab="log2(area)",ylab="lakes",labels="names")
title("The areas of the Manitoba lakes on logarithmic scale")
```



Solution for MB.Ch1.8

```
sum(area)
```

```
## [1] 41771
```