

homework1

hxp

2021/7/10

1

a

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

```
## [1] "list"
```

```
iowa.df <- as.data.frame(iowa.df)  
typeof(iowa.df)
```

```
## [1] "list"
```

b

```
nrow(iowa.df)
```

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

```
ncol(iowa.df)
```

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

```
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
```

```
5 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
```

2

2

a

b

3

a

```
a <- seq(1, 10000, 372)
a
```

```
## [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
```

372

```
a <- seq(1, 10000, (10000 - 1) %/% 49)
a
```

```
## [1] 1 205 409 613 817 1021 1225 1429 1633 1837 2041 2245 2449 2653 2857
## [16] 3061 3265 3469 3673 3877 4081 4285 4489 4693 4897 5101 5305 5509 5713 5917
## [31] 6121 6325 6529 6733 6937 7141 7345 7549 7753 7957 8161 8365 8569 8773 8977
## [46] 9181 9385 9589 9793 9997
```

```
length(a)
```

```
## [1] 50
```

50

b

times each

MB.Ch1.2

```
library(DAAG)
```

```
##      lattice
data(orings)

colnames(orings)

## [1] "Temperature" "Erosion"      "Blowby"      "Total"

nrow(orings)

## [1] 23

orings
```

```
##      Temperature Erosion Blowby Total
## 1           53      3      2      5
## 2           57      1      0      1
## 3           58      1      0      1
## 4           63      1      0      1
## 5           66      0      0      0
## 6           67      0      0      0
## 7           67      0      0      0
## 8           67      0      0      0
## 9           68      0      0      0
## 10          69      0      0      0
## 11          70      1      0      1
## 12          70      0      0      0
## 13          70      1      0      1
## 14          70      0      0      0
## 15          72      0      0      0
## 16          73      0      0      0
## 17          75      0      0      0
## 18          75      0      2      1
## 19          76      0      0      0
## 20          76      0      0      0
## 21          78      0      0      0
## 22          79      0      0      0
## 23          81      0      0      0
```

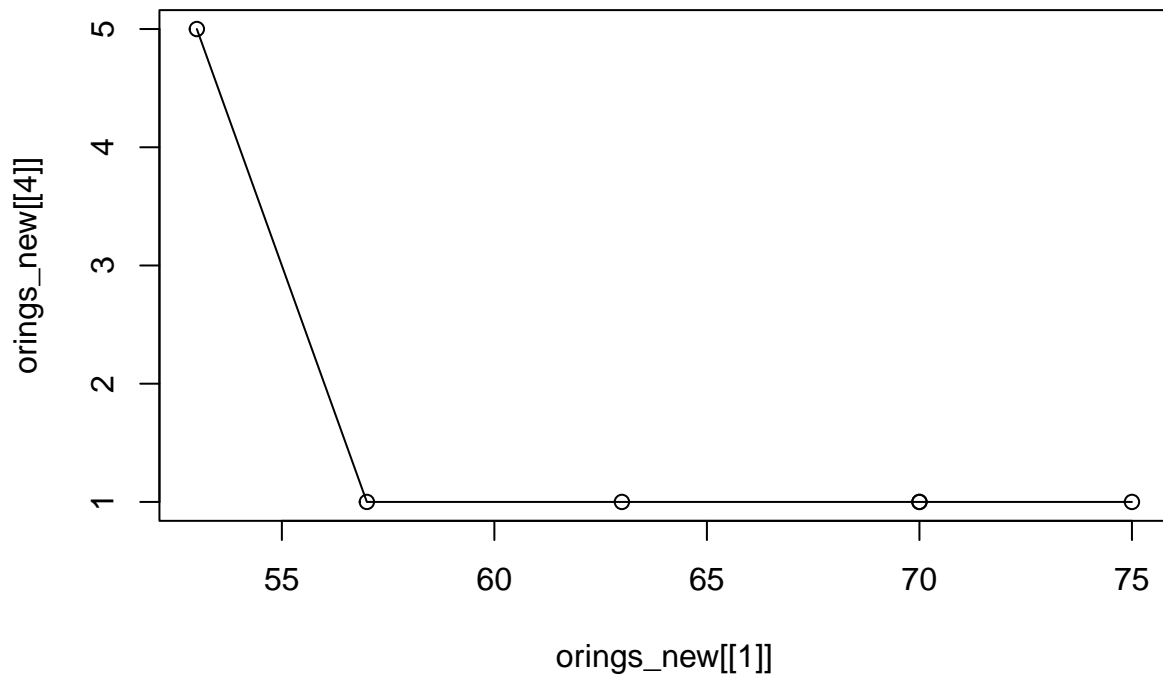
```
orings_new <- orings[c(1, 2, 4, 11, 13, 18), ]
orings_new
```

```
##      Temperature Erosion Blowby Total
## 1           53      3      2      5
## 2           57      1      0      1
## 4           63      1      0      1
## 11          70      1      0      1
## 13          70      1      0      1
## 18          75      0      2      1
```

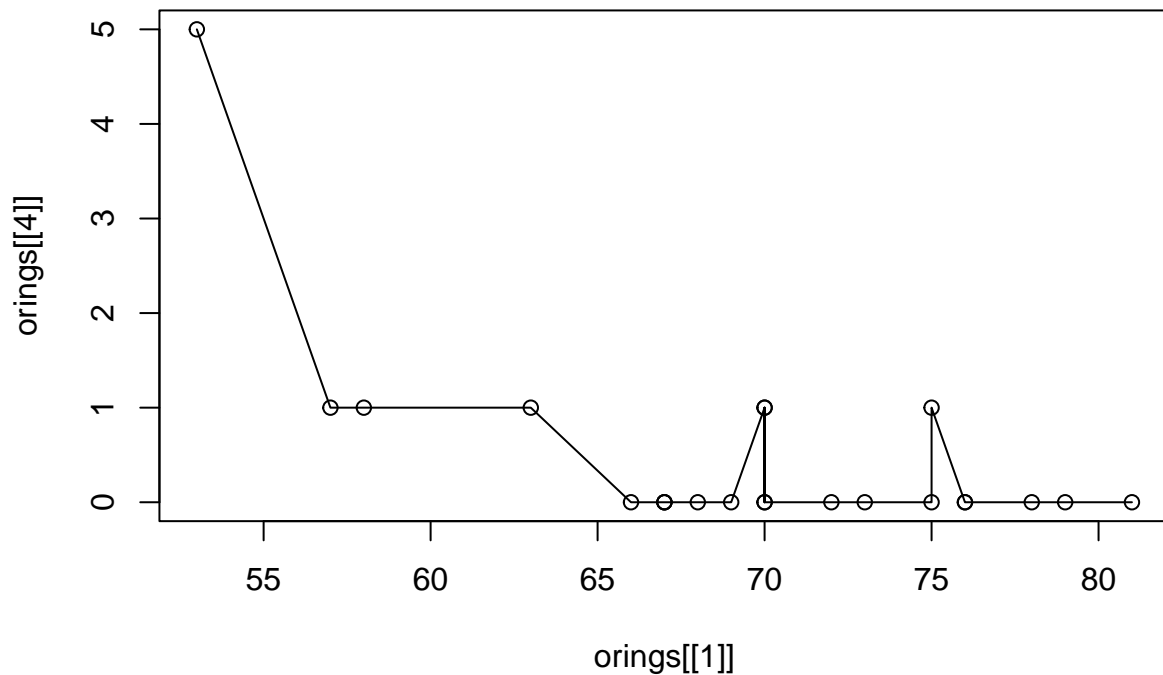
```
which(orings[[4]] > 0)
```

```
## [1] 1 2 3 4 11 13 18
```

```
plot(x = orings_new[[1]], y = orings_new[[4]], type = "o")
```



```
plot(x = orings[[1]], y = orings[[4]], type = "o")
```



MB.Ch1.4

(a)

```
data(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 ...
apply(ais, 2, function(x) any(is.na(x)))
```

```
## rcc wcc hc hg ferr bmi ssf pcBfat lbm ht wt
```

```
## FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## sex sport
## FALSE FALSE
NA
```

(b)

```
sport_new <- c()
m_new <- c()
f_new <- c()

ais_sport <- ais[["sport"]][!duplicated(ais[["sport"]])]
#
for(sport in ais_sport){
  ais_new <- ais[ais[["sport"]] == sport, ]
  sport_new <- c(sport_new, sport)
  tmp <- sum(ais_new[["sex"]] == "m")
  m_new <- c(m_new, tmp)
  f_new <- c(f_new, nrow(ais_new) - tmp)
}
gender.data.frame <- data.frame(sport = sport_new, m = m_new, f = f_new)
gender.data.frame
```

```
##      sport  m  f
## 1  B_Ball 12 13
## 2      Row 15 22
## 3 Netball  0 23
## 4   Swim 13  9
## 5   Field 12  7
## 6  T_400m 18 11
## 7 T_Sprnt 11  4
## 8   Tennis  4  7
## 9     Gym  0  4
## 10 W_Polo 17  0
```

```
imbalanced_sports <- gender.data.frame[["sport"]][ (gender.data.frame[["m"]] / gender.data.frame[["f"]] > 1 ) ]
imbalanced_sports
```

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

MB.Ch1.6

(a)

```
data(Manitoba.lakes)
Manitoba.lakes
```

```
##           elevation  area
## Winnipeg           217 24387
## Winnipegosis       254  5374
## Manitoba           248  4624
## SouthernIndian     254  2247
## Cedar              253  1353
## Island             227  1223
```

```
## Gods          178  1151
## Cross         207   755
## Playgreen     217   657
```

```
row.names(Manitoba.lakes)
```

```
## [1] "Winnipeg"      "Winnipegosis"  "Manitoba"      "SouthernIndian"
## [5] "Cedar"         "Island"        "Gods"          "Cross"
## [9] "Playgreen"
```

```
attach(Manitoba.lakes)
plot(log2(area) ~ elevation, pch=16, xlim=c(170,260))
text(log2(area) ~ elevation, labels=row.names(Manitoba.lakes), pos=4)
text(log2(area) ~ elevation, labels=area, pos=2)
title("Manitoba's Largest Lakes")
#mtext("y", side = 2)
text(183, 11.5, " y")
```

```
## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <e6> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <b3> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <a8> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <e6> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <84> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <8f> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <e8> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <bd> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <b4> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <e4> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <b8> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <ba> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <e5> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <af> dot

## Warning in text.default(183, 11.5, " y"): 'mbcsToSbcs'
## ' ' <b9> dot
```

```

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <e6> dot

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <95> dot

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <b0> dot

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <e5> dot

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <b0> dot

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <ba> dot

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <e5> dot

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <ba> dot

## Warning in text.default(183, 11.5, " y      "): 'mbcsToSbcs'
## '      ' <a6> dot

## Warning in text.default(183, 11.5, " y      "): Unicode U+6ce8
##

## Warning in text.default(183, 11.5, " y      "): Unicode U+610f
##

## Warning in text.default(183, 11.5, " y      "): Unicode U+8f74
##

## Warning in text.default(183, 11.5, " y      "): Unicode U+4e3a
##

## Warning in text.default(183, 11.5, " y      "): Unicode U+5bf9
##

## Warning in text.default(183, 11.5, " y      "): Unicode U+6570
##

## Warning in text.default(183, 11.5, " y      "): Unicode U+5c3a
##

## Warning in text.default(183, 11.5, " y      "): Unicode U+5ea6
##

text(190, 11, "      m ")

## Warning in text.default(190, 11, "      m "):
## 'mbcsToSbcs' '      m ' <e8>
## dot

## Warning in text.default(190, 11, "      m "):
## 'mbcsToSbcs' '      m ' <80>
## dot

## Warning in text.default(190, 11, "      m "):
## 'mbcsToSbcs' '      m ' <8c>
## dot

```



```

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <e7>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <82>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <b9>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <e7>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <9a>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <84>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <e5>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <b7>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <a6>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <e8>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <be>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <b9>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <e4>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <b8>
## dot

## Warning in text.default(190, 11, "      m"):
## 'mbcsToSbcs' '      m ' <ba>
## dot

## Warning in text.default(190, 11, "      m"):

```

```

## 'mbcsToSbcs' '          m ' <e7>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <9c>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <9f>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <e5>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <ae>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <9e>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <e6>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <b5>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <b7>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <e6>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <8b>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <94>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <e5>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <8d>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <95>
## dot

## Warning in text.default(190, 11, "          m "):
## 'mbcsToSbcs' '          m ' <e4>

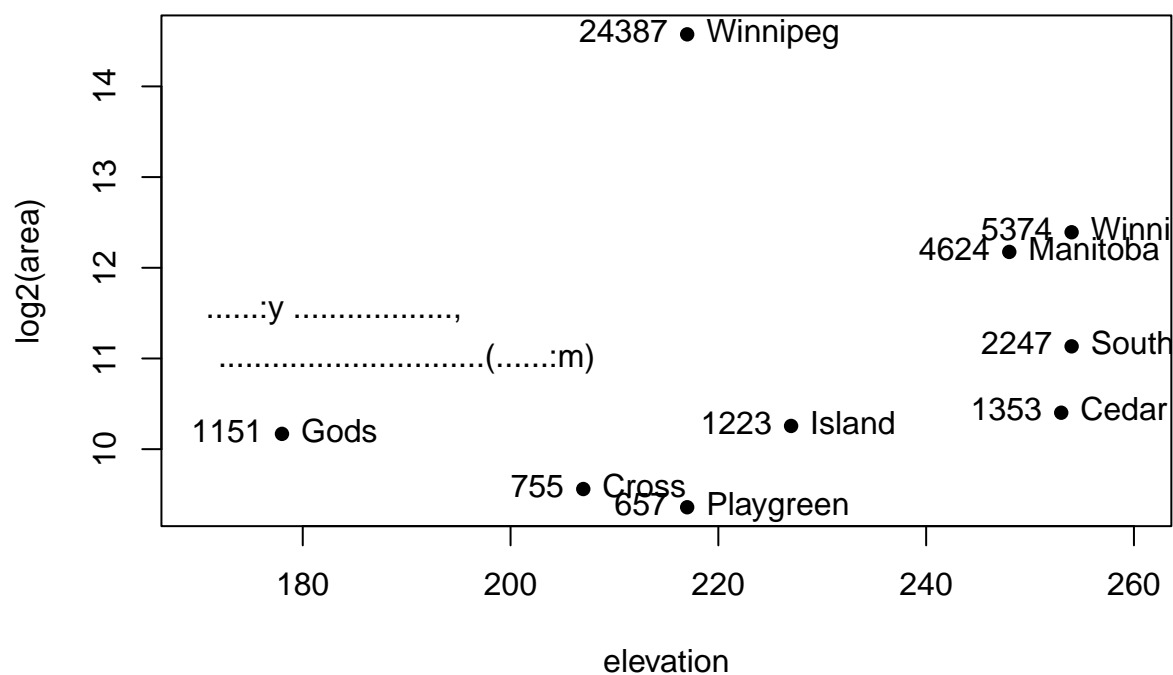
```

```

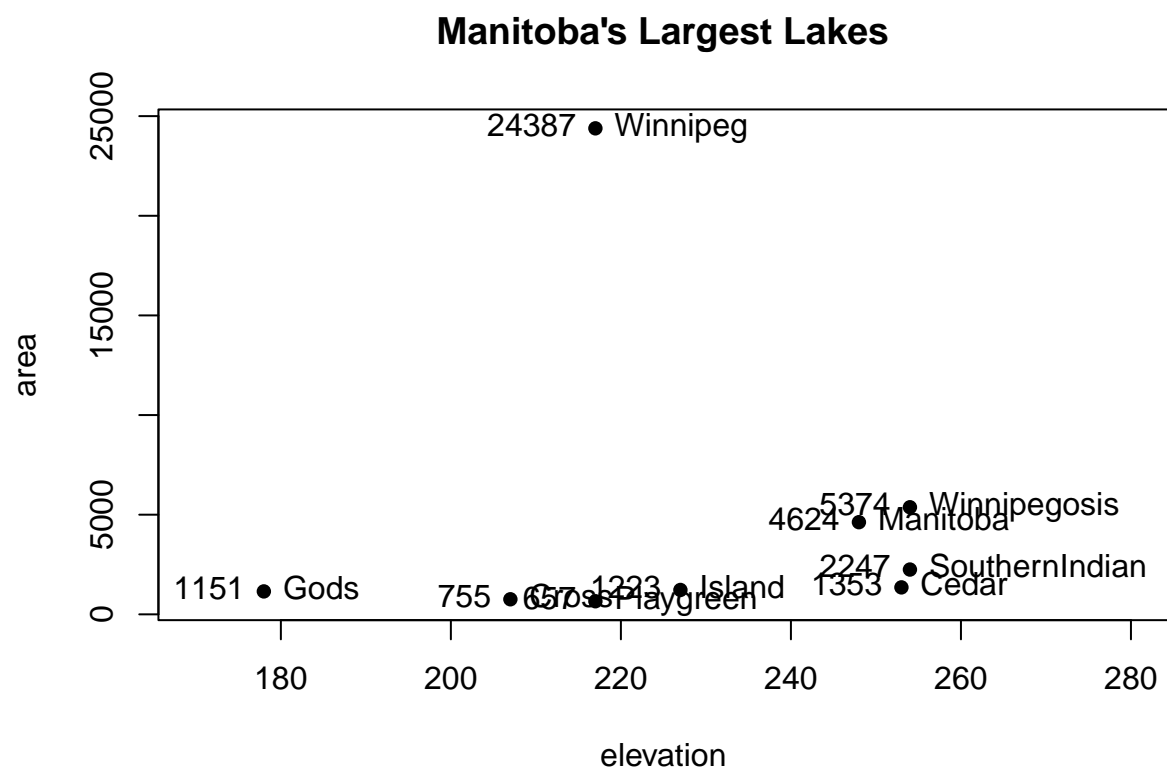
## dot
## Warning in text.default(190, 11, "      m "):
## 'mbcsToSbcs' '      m ' <bd>
## dot
## Warning in text.default(190, 11, "      m "):
## 'mbcsToSbcs' '      m ' <8d>
## dot
## Warning in text.default(190, 11, "      m "): Unicode
## U+800c
## Warning in text.default(190, 11, "      m "): Unicode
## U+70b9
## Warning in text.default(190, 11, "      m "): Unicode
## U+7684
## Warning in text.default(190, 11, "      m "): Unicode
## U+5de6
## Warning in text.default(190, 11, "      m "): Unicode
## U+8fb9
## Warning in text.default(190, 11, "      m "): Unicode
## U+4e3a
## Warning in text.default(190, 11, "      m "): Unicode
## U+771f
## Warning in text.default(190, 11, "      m "): Unicode
## U+5b9e
## Warning in text.default(190, 11, "      m "): Unicode
## U+6d77
## Warning in text.default(190, 11, "      m "): Unicode
## U+62d4
## Warning in text.default(190, 11, "      m "): Unicode
## U+5355
## Warning in text.default(190, 11, "      m "): Unicode
## U+4f4d

```

Manitoba's Largest Lakes



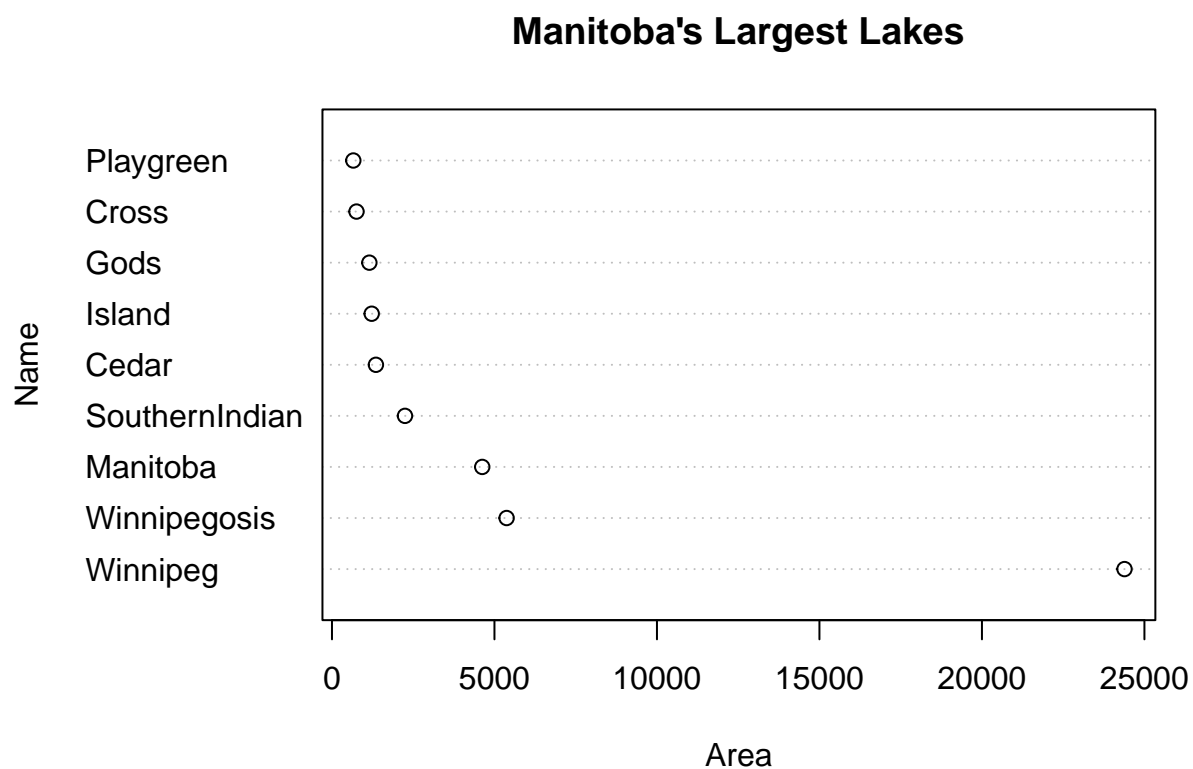
```
plot(area ~ elevation, pch=16, xlim=c(170,280), ylog=T)
text(area ~ elevation, labels=row.names(Manitoba.lakes), pos=4, ylog=T)
text(area ~ elevation, labels=area, pos=2, ylog=T)
title("Manitoba's Largest Lakes")
```



MB.Ch1.7

(a)

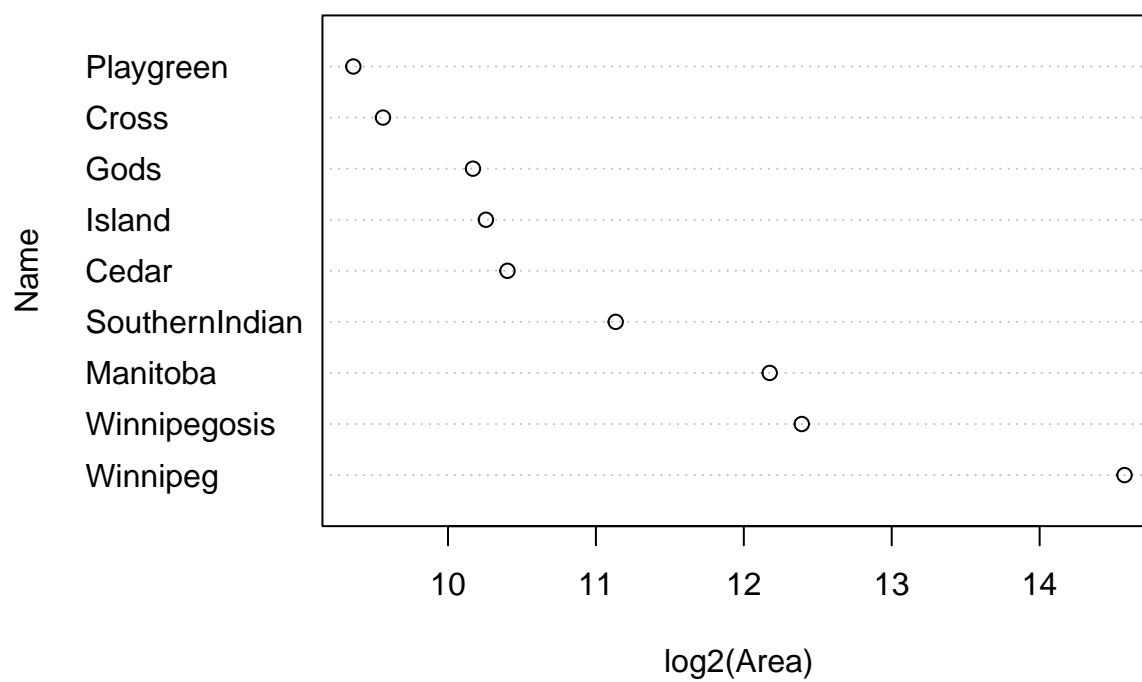
```
dotchart(area, labels=row.names(Manitoba.lakes), xlab = "Area", ylab = "Name", main = "Manitoba's Largest Lakes")
```



(b)

```
dotchart(log2(area), labels=row.names(Manitoba.lakes), xlab = "log2(Area)", ylab = "Name", main = "Mani
```

Manitoba's Largest Lakes



MB.Ch1.8

```
lower_bound <- sum(area)
lower_bound
```

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