Wheat Harvested Surface in Spain 2004

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6. The wheat table shown on p26 gives the wheat harvested surfaces in 2004 by autonomous communities in Spain measured in hectares.

```
library(PASWR2)
```

```
## Warning: package 'PASWR2' was built under R version 3.4.2
```

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

```
## Loading required package: ggplot2
```

a) Create the var's community and wheat.surface from the Wheat Table. store both var's in a data.frame named wheat.spain.

```
community <- c("Galicia", "Asturias", "Cantabria", "Pais Vasco", "Navarra", "La Rioja", "Aragon", "Catal
wheat.surface <- c(18817, 65, 440, 25143, 66326, 34214, 311479, 74206, 7203, 619858, 13118, 263424, 611
wheat.spain <- data.frame(community, wheat.surface)
head(wheat.spain)
```

```
##    community wheat.surface
## 1    Galicia         18817
## 2   Asturias            65
## 3  Cantabria           440
## 4 Pais Vasco         25143
## 5    Navarra         66326
## 6   La Rioja         34214
```

b) Find the maximum, the minimum, and the range for the variable wheat.surface.

```
max(wheat.spain$wheat.surface)
```

```
## [1] 619858
```

```
min(wheat.spain$wheat.surface)
```

```
## [1] 65
```

```
diff(range(wheat.spain$wheat.surface))
```

```
## [1] 619793
```

c) Which community has the largest harvested wheat surface?

```
wheat.spain[wheat.spain$wheat.surface == max(wheat.spain$wheat.surface),]
```

```
##          community wheat.surface
## 10 Castilla y Leon        619858
```

d) Sort the autonomous communities in ascending order.

```
asc_order <- wheat.spain[order(wheat.spain$wheat.surface, decreasing = FALSE), ]
head(asc_order)
```

```
##           community wheat.surface
## 2          Asturias            65
## 17   Islas Canarias           100
```

```
## 3         Cantabria           440
## 13    C. Valenciana          6111
## 9    Islas Baleares          7203
## 14 Region de Murcia          9500
```

e) Sort the autonomous communities in decending order.

```
dec_order <- wheat.spain[order(wheat.spain$wheat.surface, decreasing = TRUE), ]
head(dec_order)
```

```
##             community wheat.surface
## 10    Castilla y Leon        619858
## 16          Andalucia        558292
## 7              Aragon        311479
## 12 Castilla-La Mancha        263424
## 15        Extremadura        143250
## 8             Cataluna         74206
```

f) Create a new file called wheat.c where Asturias has been removed.

```
wheat.c <- wheat.spain[wheat.spain$community != "Asturias", ]
head(wheat.c)
```

```
##    community wheat.surface
## 1    Galicia         18817
## 3  Cantabria           440
## 4 Pais Vasco         25143
## 5    Navarra         66326
## 6   La Rioja         34214
## 7     Aragon        311479
```

g) Add Asturias back to the file wheat.c

```
wheat.c <- rbind(wheat.c, wheat.spain[wheat.spain$community == "Asturias", ])
wheat.c
```

```
##             community wheat.surface
## 1             Galicia         18817
## 3           Cantabria           440
## 4          Pais Vasco         25143
## 5             Navarra         66326
## 6            La Rioja         34214
## 7              Aragon        311479
## 8             Cataluna         74206
## 9      Islas Baleares          7203
## 10    Castilla y Leon        619858
## 11             Madrid         13118
## 12 Castilla-La Mancha        263424
## 13      C. Valenciana          6111
## 14   Region de Murcia          9500
## 15        Extremadura        143250
## 16          Andalucia        558292
## 17     Islas Canarias           100
## 2             Asturias            65
```

h) Create in wheat.c a new variable called acre indicating the harvested surface in acres (1 acre = 0.40468564224 hectares).

```
wheat.c <- within(data = wheat.c, {
  acre <- wheat.surface/0.40468564224
  })
head(wheat.c)
```

```
##    community wheat.surface       acre
## 1    Galicia         18817  46497.820
## 3  Cantabria           440   1087.264
## 4 Pais Vasco         25143  62129.706
## 5    Navarra         66326 163895.115
## 6   La Rioja         34214  84544.635
## 7     Aragon        311479 769681.371
```

i) What is the total harvested surface in hectares and in acres in Spain in 2004?

```
sum(wheat.c$wheat.surface)
```

```
## [1] 2151546
```

```
sum(wheat.c$acre)
```

```
## [1] 5316586
```

j) Define in wheat.c the row.names() using the names of the communities. Remove the community variable from wheat.c

```
#rm(community, wheat.surface)
no_community <- wheat.c[, -1]
row.names(no_community) <- wheat.c[, 1]
wheat.c <- no_community
head(wheat.c)
```

```
##            wheat.surface       acre
## Galicia            18817  46497.820
## Cantabria            440   1087.264
## Pais Vasco         25143  62129.706
## Navarra            66326 163895.115
## La Rioja           34214  84544.635
## Aragon            311479 769681.371
```

k) What percent of the commumities have a harvested wheat surface greater than the mean wheat surface area?

```
PCA <- mean(wheat.c$wheat.surface > mean(wheat.c$wheat.surface))*100
PCA
```

```
## [1] 29.41176
```

l) Sort wheat.c by autonomous communities' name (row.names()).

```
sorted_AO <- wheat.c[order(row.names(wheat.c)), ]
head(sorted_AO)
```

```
##                     wheat.surface         acre
## Andalucia                  558292 1379569.5763
## Aragon                     311479  769681.3711
## Asturias                       65     160.6185
## C. Valenciana                6111   15100.6099
## Cantabria                     440    1087.2637
## Castilla-La Mancha         263424  650934.8801
```

m) Determine the communities with less than 40,000 acres of harvested surface and find thier total harvested surface in hectares and acres.

```
less_than_40k <- wheat.c[wheat.c$acre < 40000, ]
less_than_40k
```

```
##                  wheat.surface       acre
## Cantabria                  440  1087.2637
## Islas Baleares            7203 17799.0006
## Madrid                   13118 32415.2839
## C. Valenciana             6111 15100.6099
## Region de Murcia          9500 23475.0112
## Islas Canarias             100   247.1054
## Asturias                    65   160.6185
```

```
apply(less_than_40k, 2, sum)
```

```
## wheat.surface          acre
##      36537.00      90284.89
```

n) Create a new file called wheat.sum where the autonomous communities that have less than 40,000 acres of harvested surface are consolidated into a single category named "less than 40,000" with the results from (m).

```
lt_40 <- apply(less_than_40k, 2, sum)
gt_40 <- wheat.c[wheat.c$acre >= 40000, ]
wheat.sum <- rbind(gt_40, lt_40)
row.names(wheat.sum)[11] <- c("less than 40,000")
wheat.sum
```

```
##                    wheat.surface       acre
## Galicia                    18817   46497.82
## Pais Vasco                 25143   62129.71
## Navarra                    66326  163895.12
## La Rioja                   34214   84544.64
## Aragon                    311479  769681.37
## Cataluna                   74206  183367.02
## Castilla y Leon           619858 1531702.48
## Castilla-La Mancha        263424  650934.88
## Extremadura               143250  353978.46
## Andalucia                 558292 1379569.58
## less than 40,000           36537   90284.89
```

o) Use the function dump() on wheat.c storing the results in a new file named wheat.txt. Remove wheat.c from your path and check that you can recover it from wheat.txt.

```
dump("wheat.c", file = "wheat.txt")
rm("wheat.c")
source("wheat.txt")
head(wheat.c)
```

```
##             wheat.surface       acre
## Galicia             18817  46497.820
## Cantabria             440   1087.264
## Pais Vasco          25143  62129.706
## Navarra             66326 163895.115
## La Rioja            34214  84544.635
## Aragon             311479 769681.371
```

p) Create a text file called wheat.dat from the wheat.sum file using the command write.table(). Explain the differences between wheat.txt and wheat.dat.

```
write.table(x = wheat.sum, file = "wheat.dat")
# The values from wheat.txt are collapsed down in wheat.dat
```

q) Use the comand read.table() to read the file wheat.dat

```
head(read.table(file = "wheat.dat"))
```

```
##            wheat.surface      acre
## Galicia            18817  46497.82
## Pais Vasco         25143  62129.71
## Navarra            66326 163895.12
## La Rioja           34214  84544.64
## Aragon            311479 769681.37
## Cataluna           74206 183367.02
```