Homework 12

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Question 1

```
length(t(unique(b)))
```

```
## [1] 354
```

Question 2

```
investment <- 10000
additional_investment <- 10000
num_years <- 0
while (investment < 1000000) {
  investment <- investment * 1.06
  investment <- investment + additional_investment
  num_years <- num_years + 1
}
num_years
```

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

Question 3

```
attach(wf)
as.vector(Country[grep("^.{3}c", as.character(Country))])
```

```
## [1] "Czechoslovakia" "Liechtenstein"  "Seychelles"
```
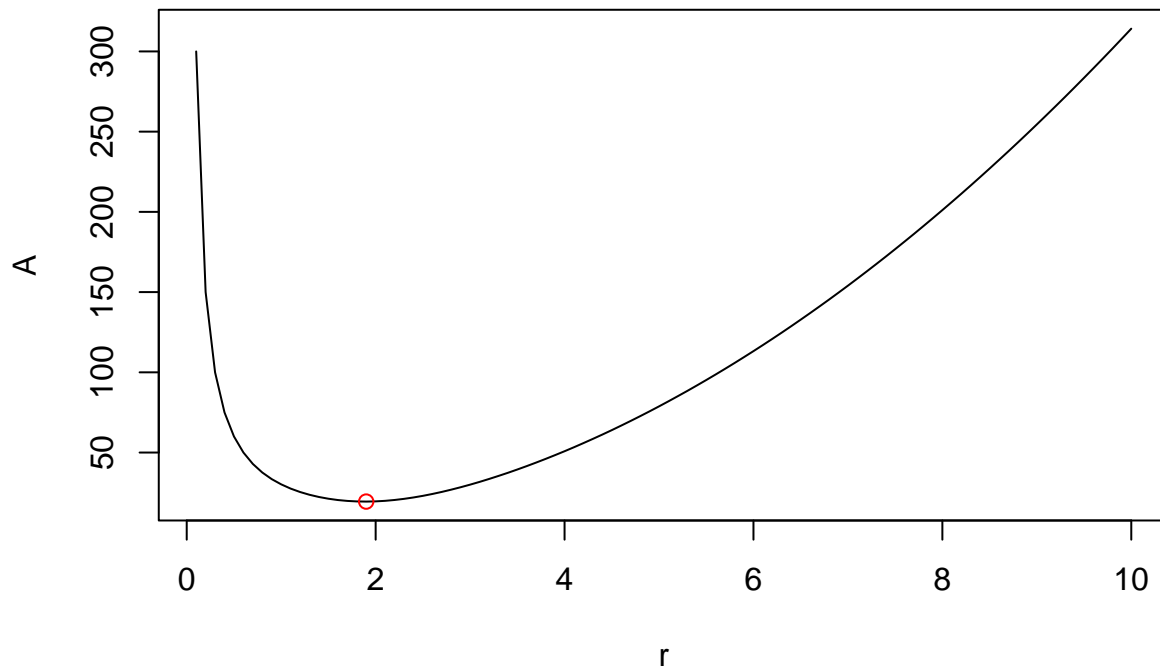
```
#as.vector(wf$Country[grep("^.{3}c", as.character(wf$Country))])
```

Question 4

```
computeArea <- function (V, r) {
  h <- V / (1/3 * pi * r^2)
  A <- pi * r * sqrt(r^2 + h^2)
  return(A)
}

V <- 10
all_r <- seq(0.1, 10, 0.1)
all_A <- vector()
for (i in 1:length(all_r)) {
  all_A[i] <- computeArea(V, all_r[i])
}

plot(all_r, all_A,  type='l', xlab = "r", ylab = "A") +
  points(all_r[which.min(all_A)], all_A[which.min(all_A)], col='red')
```

```
## integer(0)
```

```
all_r[which.min(all_A)]
```

```
## [1] 1.9
```

Question 5

```r
factorial <- function (x) {
  fact <- x
  if (x-1 > 1) {
    fact <- fact * factorial(x-1)
  }
  return(fact)
}

for (i in 1:10) {
  print(factorial(i))
}
```

```
## [1] 1
## [1] 2
## [1] 6
## [1] 24
## [1] 120
## [1] 720
## [1] 5040
## [1] 40320
## [1] 362880
## [1] 3628800
```

Question 6 a)

```
str(c)
```

```
## 'data.frame':    512 obs. of  5 variables:
```

```
## $ V1: chr  "cells" "1" "0" "1" ...
## $ V2: chr  "smoker" "T" "T" "T" ...
## $ V3: chr  "age" "young" "young" "young" ...
## $ V4: chr  "sex" "male" "male" "male" ...
## $ V5: chr  "weight" "normal" "normal" "normal" ...
```

```
str(mv)
```

```
## 'data.frame':    42 obs. of  6 variables:
## $ V1: chr  "Temp" "61.5" "55.6" "55.9" ...
## $ V2: chr  "Industry" "368" "291" "775" ...
## $ V3: chr  "Population" "497" "593" "622" ...
## $ V4: chr  "Wind" "9.1" "8.3" "9.5" ...
## $ V5: chr  "Rain" "48.34" "43.11" "35.89" ...
## $ V6: chr  "Wet.days" "115" "123" "105" ...
```

b)

```
c <- read.table('cells.txt', header = TRUE)
c <- c %>% rename(Num_Cells=cells, Smoker=smoker, Age=age, Sex=sex, Weight=weight)
str(c)
```

```
## 'data.frame':    511 obs. of  5 variables:
## $ Num_Cells: int  1 0 1 1 0 2 1 0 5 1 ...
## $ Smoker   : logi  TRUE TRUE TRUE TRUE TRUE TRUE ...
## $ Age      : chr  "young" "young" "young" "young" ...
## $ Sex      : chr  "male" "male" "male" "male" ...
## $ Weight   : chr  "normal" "normal" "normal" "normal" ...
```

```
mv <- read.table('multivariate.txt', header = TRUE)
mv <- mv %>% rename(temp=Temp, industry_id=Industry, pop=Population, wind=Wind, rain=Rain, wet_days = We
str(mv)
```

```
## 'data.frame':    41 obs. of  6 variables:
## $ temp       : num  61.5 55.6 55.9 51 68.4 47.6 66.2 49.9 57.8 50.4 ...
## $ industry_id: int  368 291 775 137 136 44 641 1064 197 347 ...
## $ pop        : int  497 593 622 176 529 116 844 1513 299 520 ...
## $ wind       : num  9.1 8.3 9.5 8.7 8.8 8.8 10.9 10.1 7.6 9.4 ...
## $ rain       : num  48.3 43.1 35.9 15.2 54.5 ...
## $ wet_days   : int  115 123 105 89 116 135 78 129 115 147 ...
```

c)

```
write.table(c, "cells_new.txt")
save(c, list=ls(all = TRUE), file="cells_new.txt",  ascii = TRUE)

write.table(mv, "multivariate_new.txt")
save(mv, list=ls(all = TRUE), file="multivariate_new.txt",  ascii = TRUE)
```