R Code for Examples in the book
"Statistics: The Art and Science of Learning from Data"
by Agresti, Franklin and Klingenberg, 5th edition

Chapter 8

Example 13: Carbon Footprint – Confidence Interval for the Correlation

Reading in the data:

```
sandwiches <-
read.csv(file='https://raw.githubusercontent.com/artofstat/data/master/Chapter7/carbon_footprint_sandwich.csv')
attach(sandwiches) # so we can refer to variable names
```

To compute the correlation coefficient between carbon footprint and energy content

```
cor(EnergyContent..kCal., Carbon.footprint..g.CO2.eq..)

## [1] 0.6208991
```

To obtain a bootstrap sample of the sandwiches

```
sample(Sandwich, replace = TRUE)

##  [1] "Egg, Bacon"        "Egg, Bacon"        "Sausage, Brown Sauce"
##  [4] "Ham, Mayo"         "Ham, Mustard"      "Chicken Salad"
##  [7] "Cheese, Pickle"    "Cheese Ploughman " "Ham, Mustard"
## [10] "Ham, Mustard"      "Ham, Mayo"         "Sausage, Brown Sauce"
## [13] "Chicken, Stuffing" "Chicken Salad"     "Tuna, Cucumber"
## [16] "Cheese, Mayo"      "Ham, Mustard"      "Ham, Egg"
## [19] "Egg, Rocket"       "Chicken Salad"     "Ham, Mustard"
## [22] "Breakfast"         "Chicken, Bacon"    "Breakfast"
```

To obtain a bootstrap sample of the rows of the dataframe, you can use
```
sandwiches[sample(seq_len(nrow(sandwiches)), replace = TRUE), ]
```

To generate 10,000 bootstrap samples and find the correlation
```
bootcorr <- c() # initializing
for (i in  1:10000) {
  bootsample <- sandwiches[sample(seq_len(nrow(sandwiches)),
                                  replace = TRUE), ]
  bootcorr[i] <- cor(bootsample$EnergyContent..kCal.,
                     bootsample$Carbon.footprint..g.CO2.eq..)
}
```

To obtain summary of the correlation coefficients from the bootstrap samples
```
quantile(bootcorr, c(0.025, 0.975))

##      2.5%     97.5%
## 0.2478260 0.8384972
```