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:

```
data <-
read.csv(file='https://raw.githubusercontent.com/artofstat/data/master/Chapte
r7/carbon_footprint_sandwich.csv')
attach(data) # 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] "Prawn, Mayo"            "Tuna, Cucumber"
##  [3] "Chicken, Sweetcorn"     "Chicken, Bacon"
##  [5] "Ham, Salad"             "Ham, Mustard"
##  [7] "Sausage, Brown Sauce"   "Tuna, Cucumber"
##  [9] "Prawn, Mayo"            "Ham, Cheese"
## [11] "Prawn, Mayo"            "Cheese, Tomato"
## [13] "Tuna, Cucumber"         "Ham, Egg"
## [15] "Prawn, Mayo"            "Chicken, Bacon"
## [17] "Ham, Mayo"              "Ham, Salad"
## [19] "Cheese, Mayo"           "Ham, Cheese"
## [21] "Breakfast"              "Bacon, Lettuce, Tomato (BLT)"
## [23] "Ham, Mayo"              "Ham, Egg"
```

To obtain a bootstrap sample of the rows of the dataframe, you can use

```
data[sample(seq_len(nrow(data)), replace = TRUE), ]
```

To generate 10,000 bootstrap samples and find the correlation

```
bootcorr <- c() # initializing
for (i in  1:10000) {
  bootsample <- data[sample(seq_len(nrow(data)), 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%
## 0.2610255 0.8379493
```