Verzani Problem Set

Next are considered the problems from Verzani's book on page 19

Problem 3.1

Enter in the data

```
> x <- c(60, 85, 72, 59, 37, 75, 93, 7, 98, 63, 41, 90, 5, 17, 97)
```

Make a stem and leaf plot

```
> sort(x)
 [1]  5  7 17 37 41 59 60 63 72 75 85 90 93 97 98
> stem(x)

  The decimal point is 1 digit(s) to the right of the |

  0 | 577
  2 | 7
  4 | 19
  6 | 0325
  8 | 50378
```

Problem 3.3

You can generate random data with the rnorm for example.

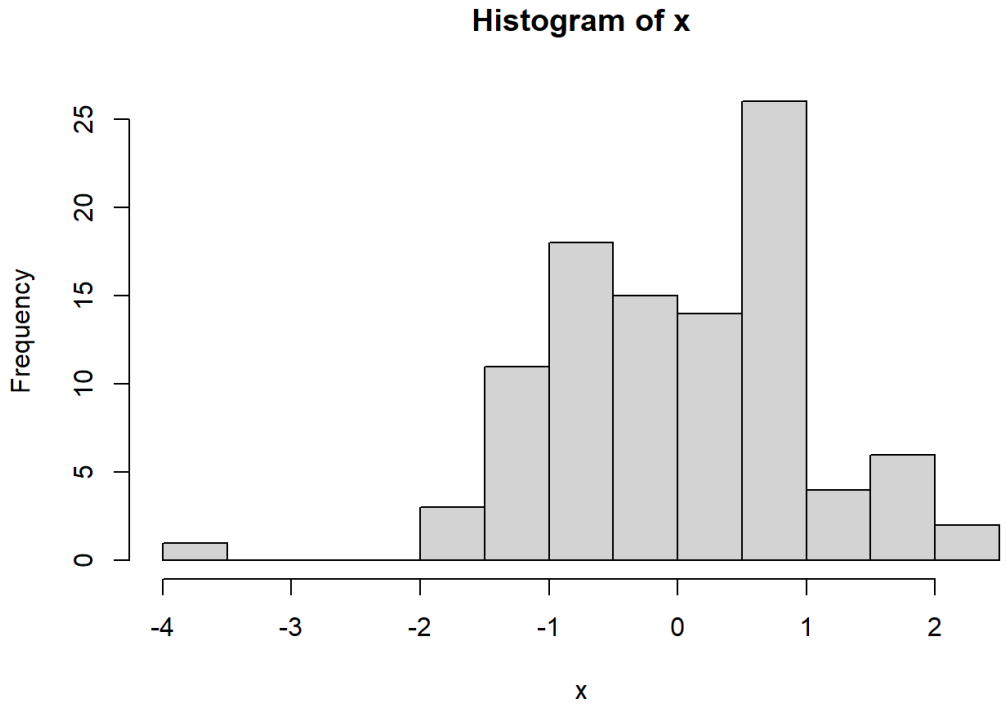
```
> x <- rnorm(100)
```

This produces 100 random numbers with normal distribution. Define it two times.

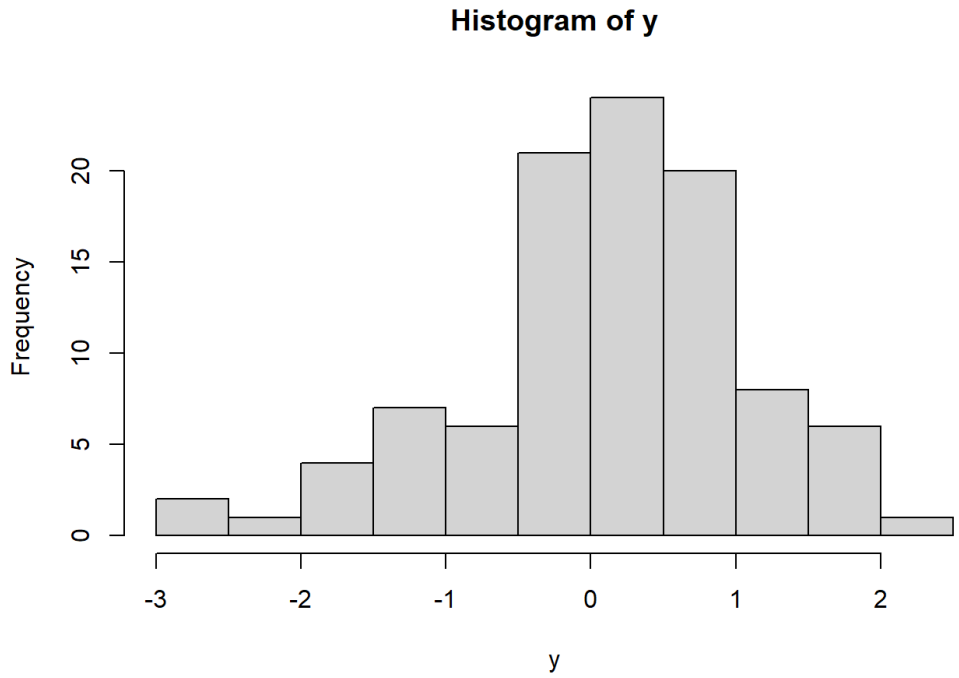
```
> y <- rnorm(100)
```

Create the two histograms. Do you get the same histogram?

```
> hist(
```



```
> hist(y)
```



Problem 3.4
Let's review south, crime and aid data frames from UsingR package. What data are they containing?

```
> library(UsingR)
Warning: package 'UsingR' was built under R version 4.0.3
Loading required package: MASS
Loading required package: HistData
Loading required package: Hmisc
Loading required package: lattice
Loading required package: survival
Loading required package: Formula
Loading required package: ggplot2

Attaching package: 'Hmisc'
The following objects are masked from 'package:base':

    format.pval, units

Attaching package: 'UsingR'
The following object is masked from 'package:survival':

    cancer
> ?south
> ?crime
> ?aid
```

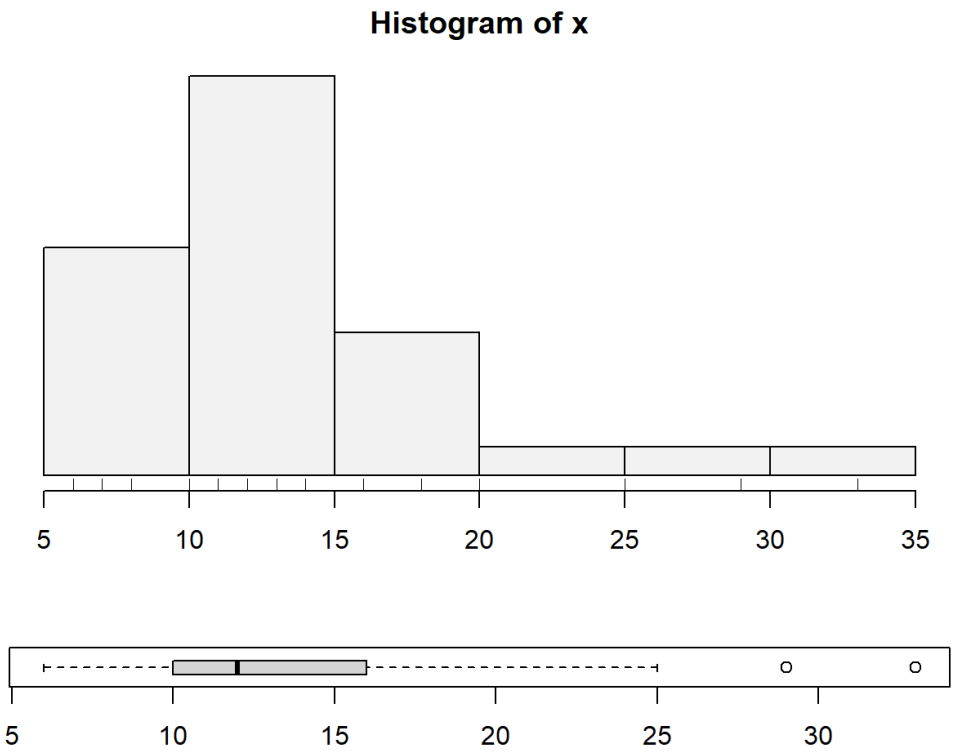
south data frame contains murder rates for 30 Southern US cities. crime data frame contains violent crime rates in 50 states of US in 1983 and 1993. aid data frame contains monthly payment for federal program.

Now lets review what are this data sets containing

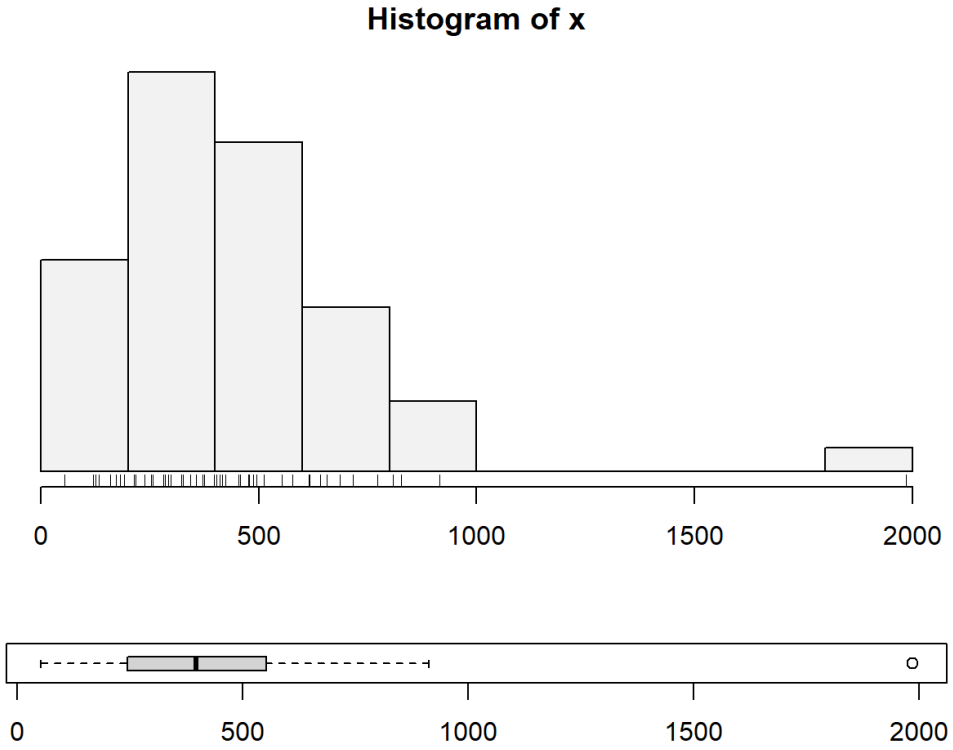
```
> head(south)
[1] 12 10 10 13 12 12
> head(crime)
           y1983  y1993
Alabama    416.0  871.7
Alaska     613.8  660.5
Arizona    494.2  670.8
Arkansas   297.7  576.5
California 772.6 1119.7
Colorado   476.4  578.8
> head(aid)
   Alabama     Alaska    Arizona   Arkansas California   Colorado
     57.16     253.54     114.23      68.22     199.57     110.86
```

Make a histogram and boxplot for every one of them. Which of them are symmetric? Which of them are skewed? Which of them has outliers?

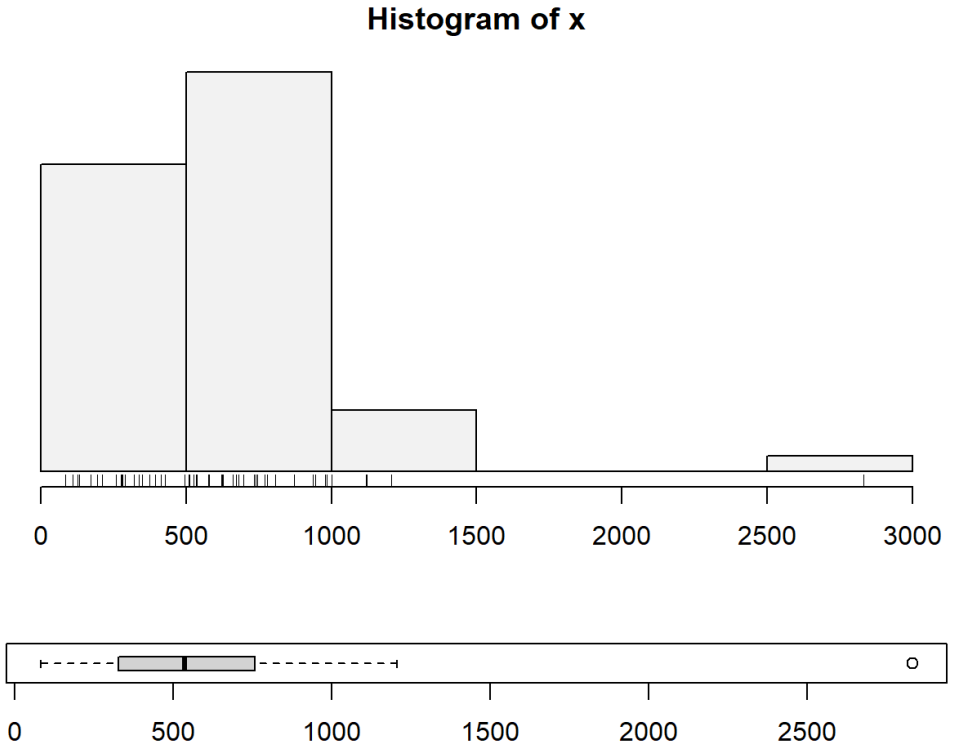
```
> simple.hist.and.boxplot(south)
```



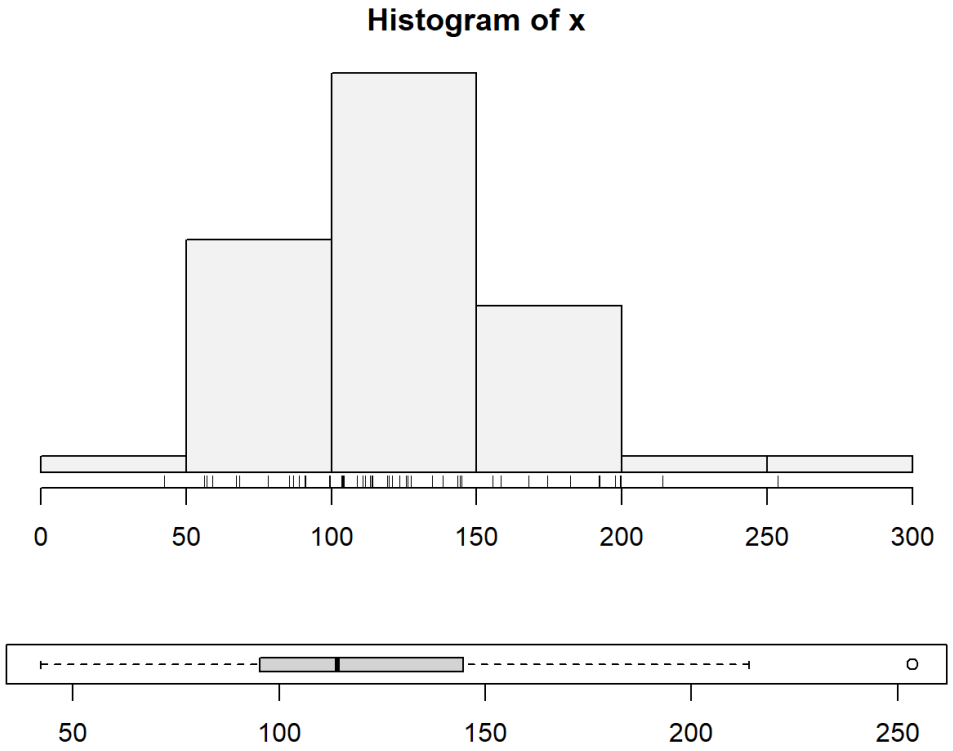
```
> simple.hist.and.boxplot(crime$y1983)
```




```
> simple.hist.and.boxplot(crime$y1993)
```



```
> simple.hist.and.boxplot(aid)
```



Problem 3.5
Let's review bumpers, firstchi and math data frames from UsingR package. What data are they containing?

```
> ?bumpers
> ?firstchi
> ?math
```

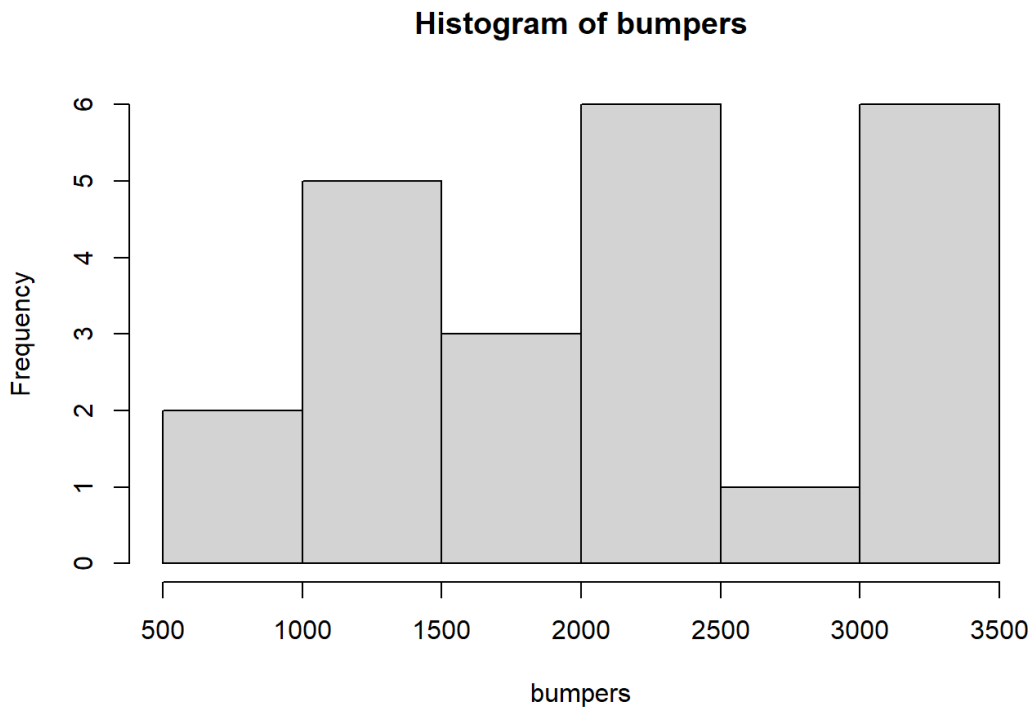
bumpers data frame contains bumper repair costs for various automobiles. firstchi data frame contains age of mother at birth of first child. math data frame contains standardized math scores.

Now lets review what are this data sets containing

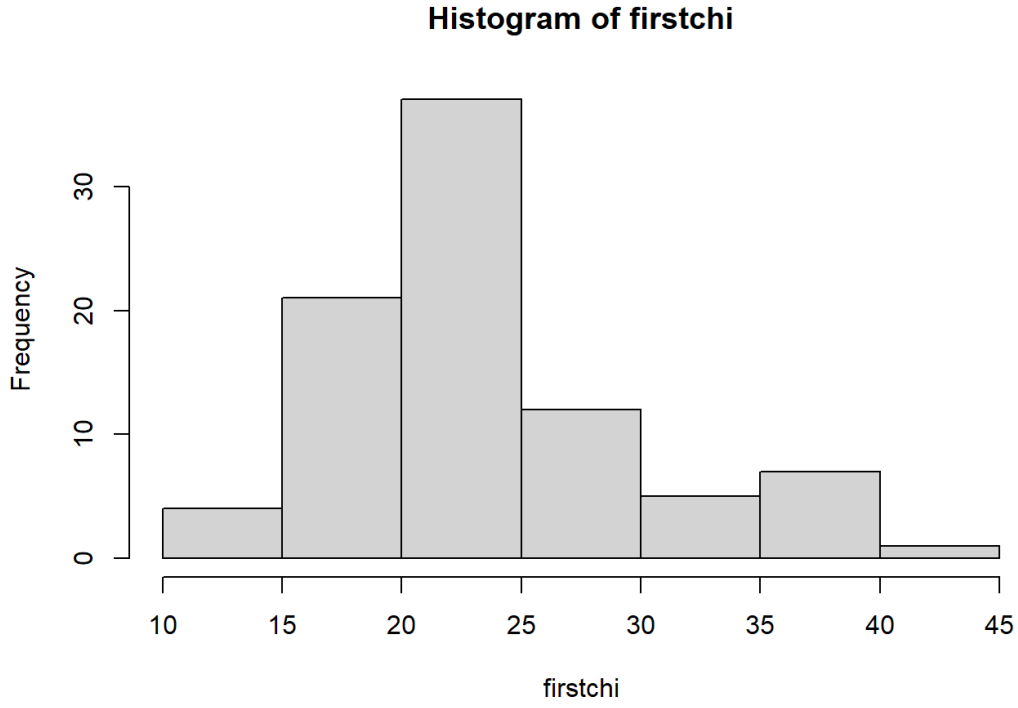
```
> head(bumpers)
     Honda Accord Chevrolet Cavalier       Toyota Camry         Saturn SL2
              618               795               1304               1308
 Mitsubishi Galant       Dodge Monaco
             1340               1456
> head(firstchi)
[1] 30 18 35 22 23 22
> head(math)
[1] 44 49 62 45 51 59
```

Make a histogram for every one of them.

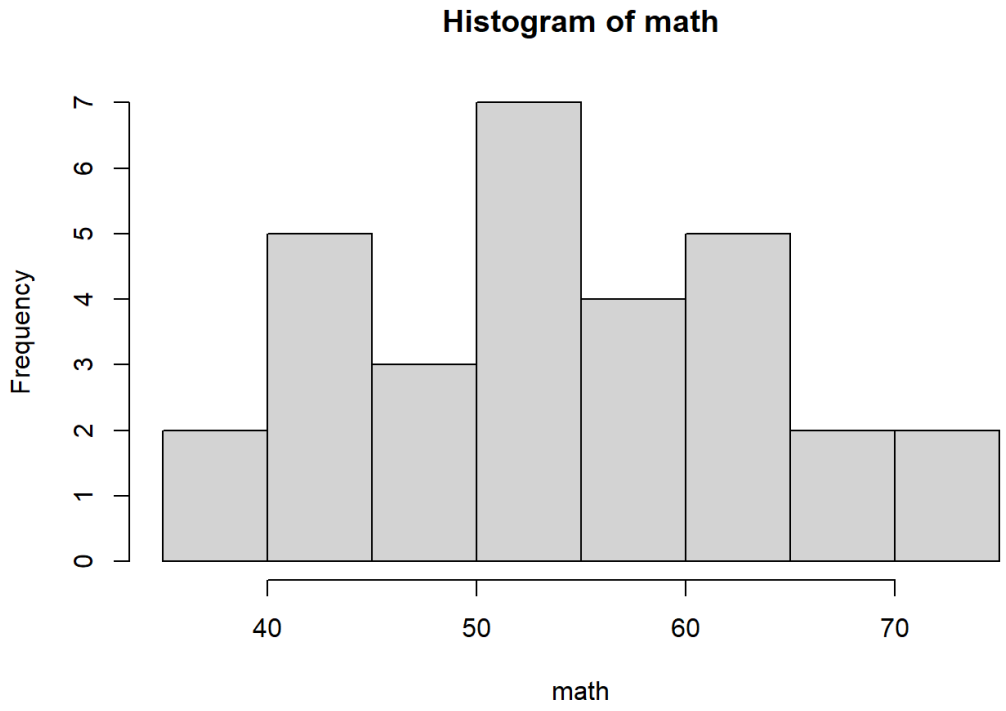
```
> hist(bumpers)
```




```
> hist(firstchi)
```



```
> hist(math)
```



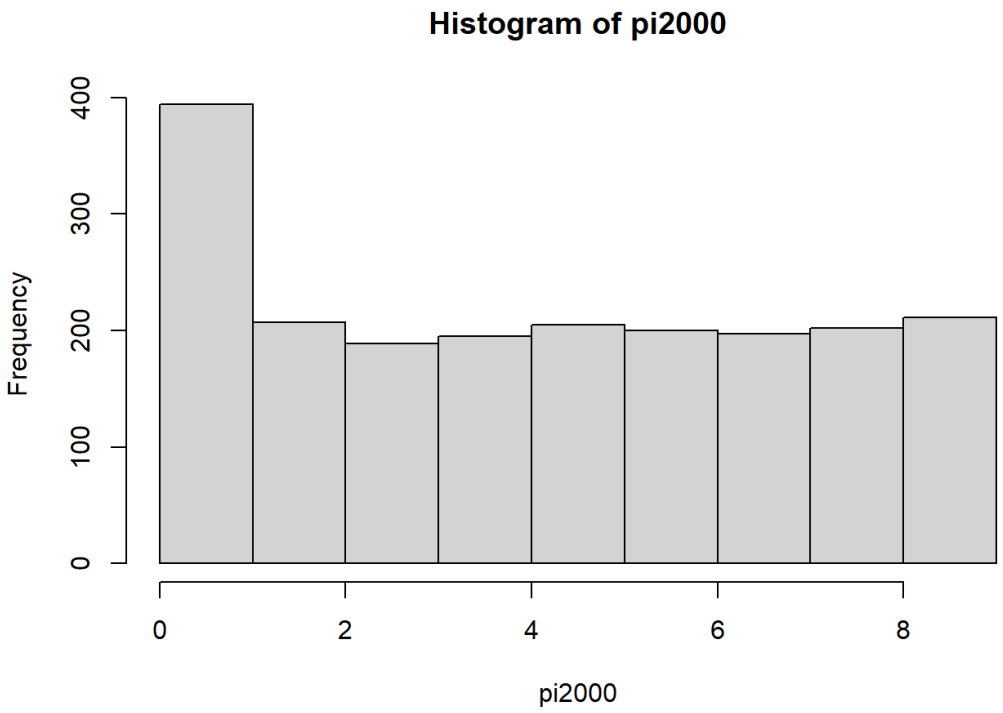
Try to predict the mean, median and standard deviation of every one of them. Check your guesses with the appropriate R commands.

```
> summary(bumpers)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
    618    1478    2129    2122    2774    3298
> summary(firstchi)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  14.00   20.00   23.00   23.98   26.00   42.00
> summary(math)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  38.00   49.00   54.00   54.90   61.75   75.00
```

Problem 3.7

The pi2000 data frames from UsingR package contains the first 2000 digits of π. Make a histogram.

```
> hist(pi2000)
```



Is it surprising? Find the proportion of 1's, 2's and so on.

```
> table(pi2000)
pi2000
  0   1   2   3   4   5   6   7   8   9
181 213 207 189 195 205 200 197 202 211
> table(pi2000) / length(pi2000)
pi2000
    0     1     2     3     4     5     6     7     8     9
0.0905 0.1065 0.1035 0.0945 0.0975 0.1025 0.1000 0.0985 0.1010 0.1055
> prop.table(table(pi2000))
pi2000
    0     1     2     3     4     5     6     7     8     9
0.0905 0.1065 0.1035 0.0945 0.0975 0.1025 0.1000 0.0985 0.1010 0.1055
> proportions(table(pi2000))
pi2000
    0     1     2     3     4     5     6     7     8     9
0.0905 0.1065 0.1035 0.0945 0.0975 0.1025 0.1000 0.0985 0.1010 0.1055
```

Problem 3.8

Fit a density estimate to the pi2000 data frame.

```
> density(pi2000)

Call:
    density.default(x = pi2000)

Data: pi2000 (2000 obs.);   Bandwidth 'bw' = 0.5657

       x                y
 Min.   :-1.697   Min.   :0.0007207
 1st Qu.: 1.401   1st Qu.:0.0755293
 Median : 4.500   Median :0.0990100
 Mean   : 4.500   Mean   :0.0805830
 3rd Qu.: 7.599   3rd Qu.:0.1007573
 Max.   :10.697   Max.   :0.1046462
> hist(pi2000, probability = TRUE)
> lines(density(pi2000), lwd = 2)
```