

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.

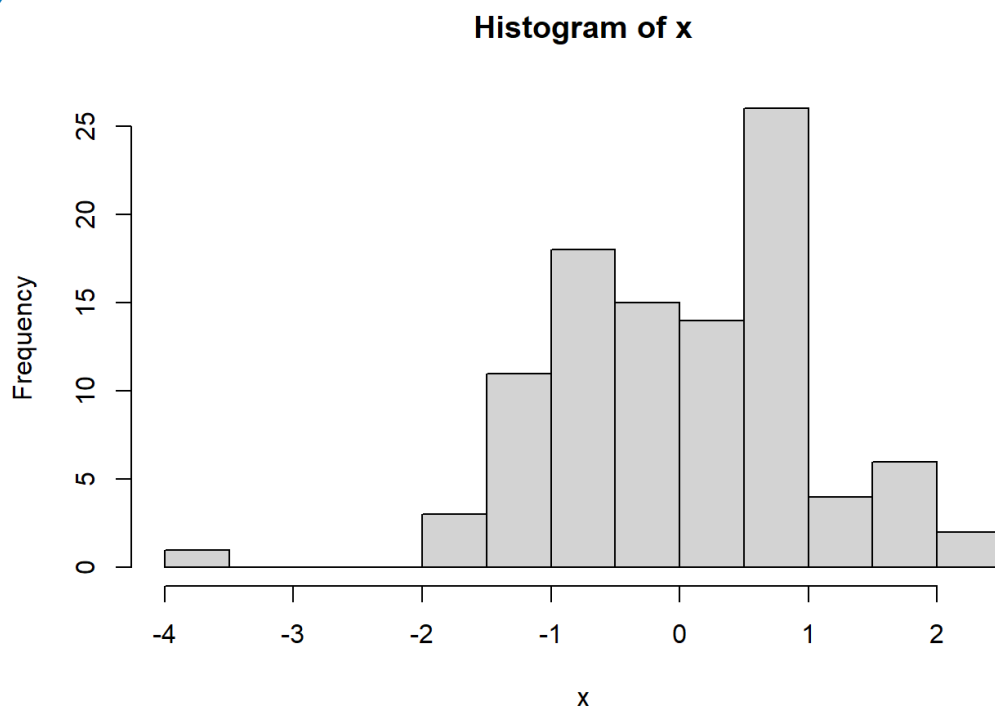
```
> x <- rnorm(100)
```

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

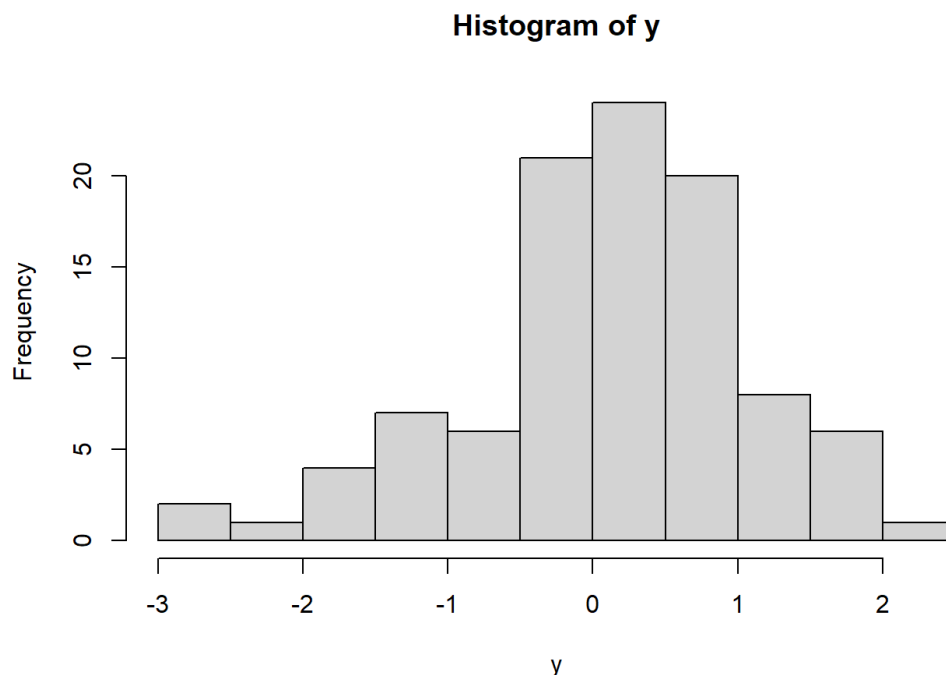
```
> y <- rnorm(100)
```

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

```
> hist(x)
```



```
> 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
```

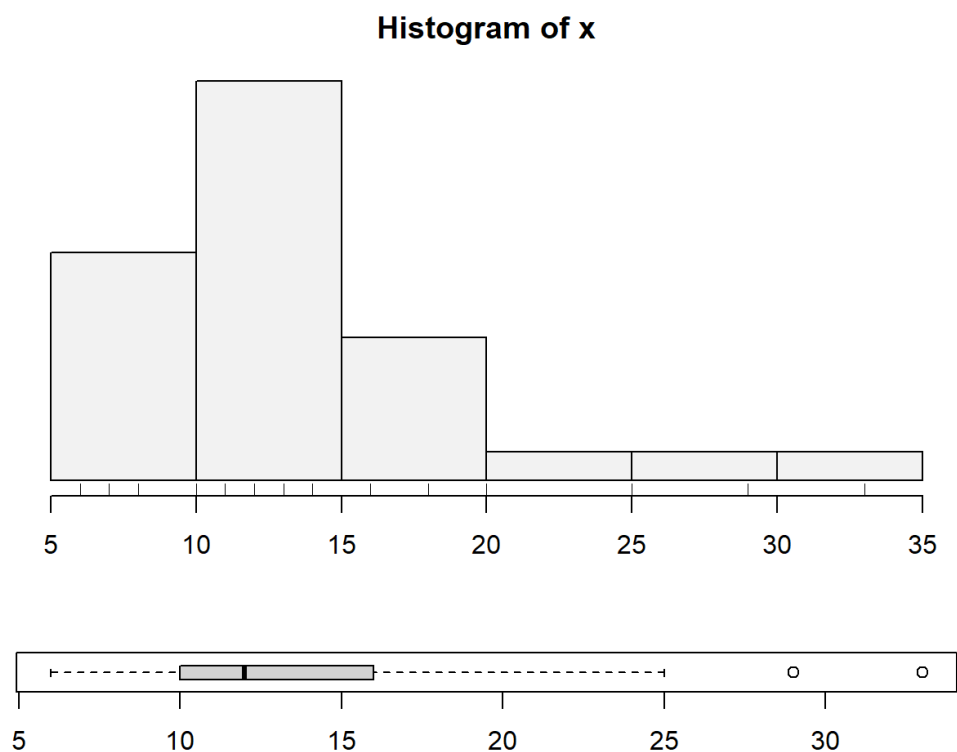
```
Colorado 476.4 578.8
```

```
> head(aid)
```

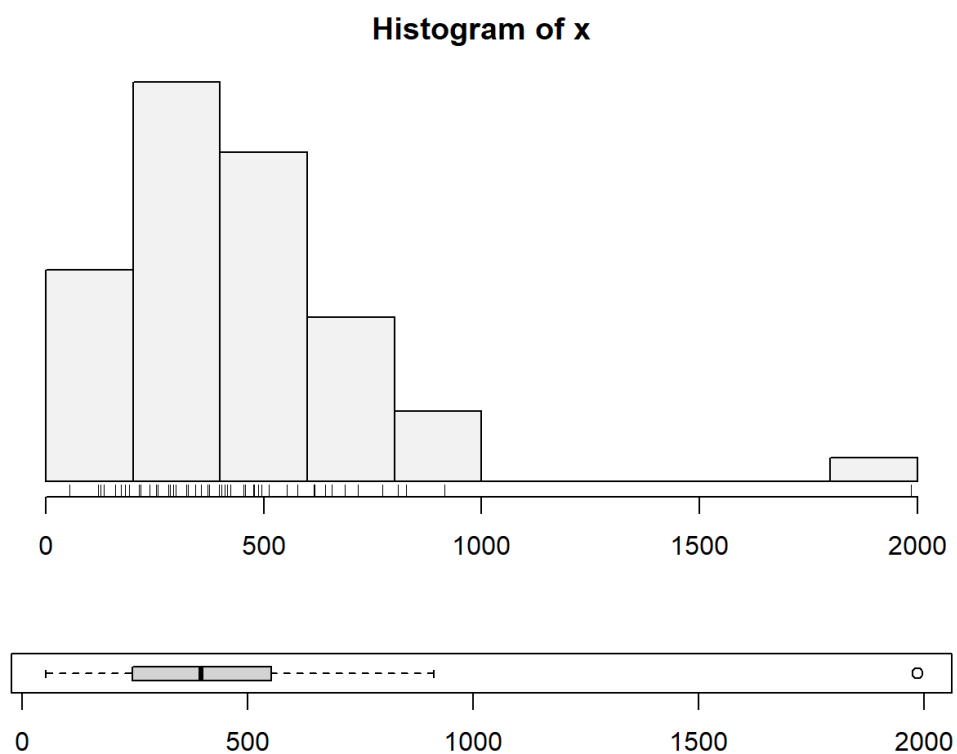
```
Alabama  Alaska  Arizona  Arkansas  California  Colorado  
57.16    253.54   114.23    68.22    199.57    110.86
```

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?

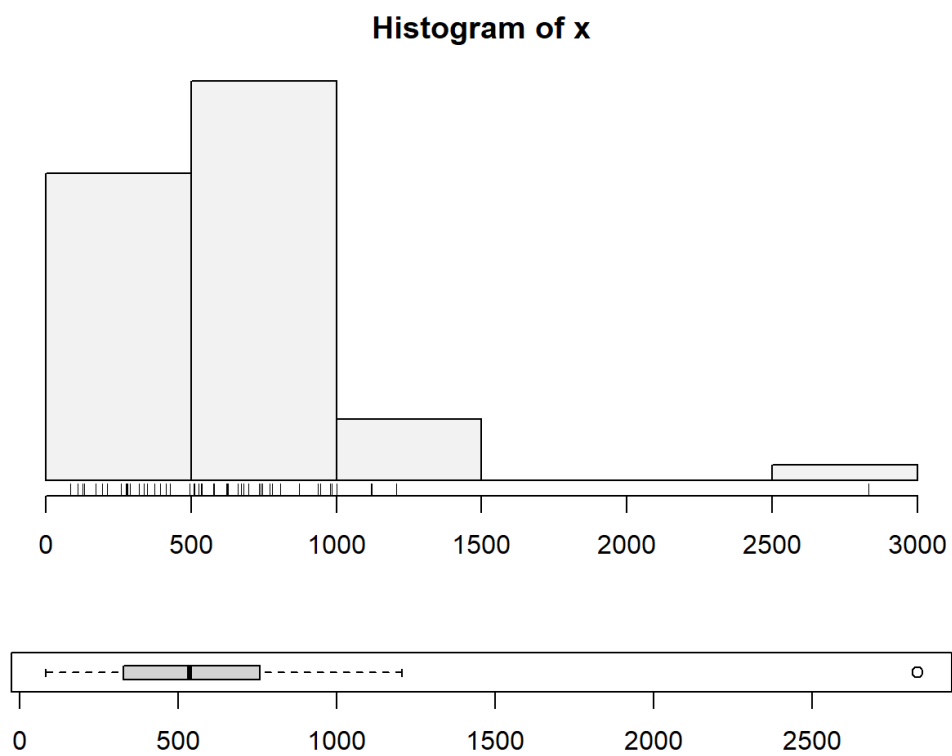
```
> simple.hist.and.boxplot(south)
```



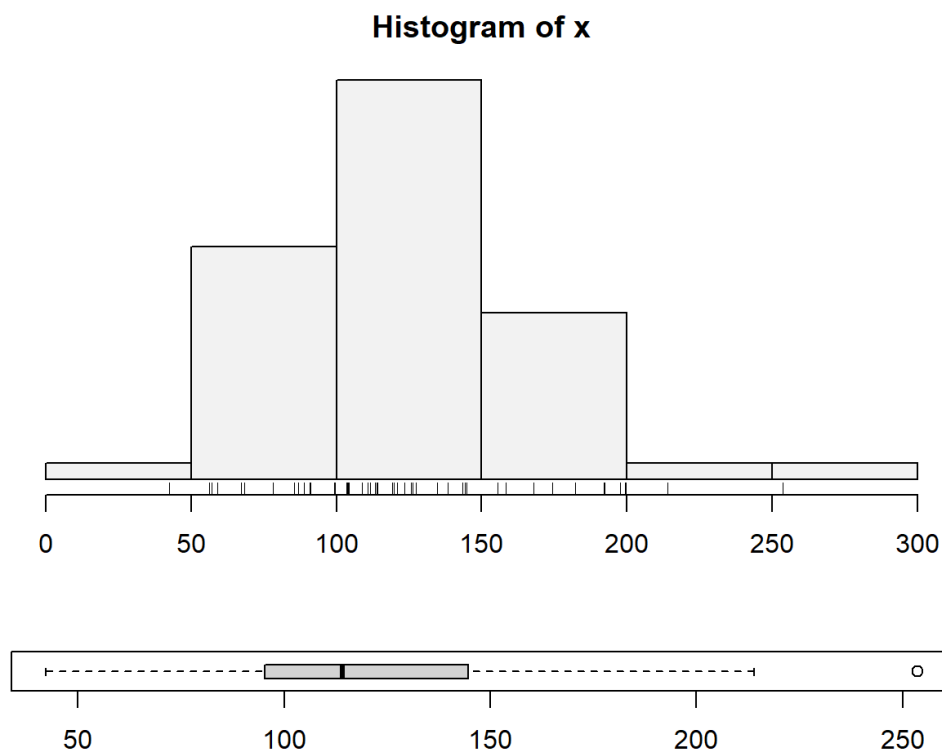
```
> simple.hist.and.boxplot(crime$y1983)
```



```
> 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 let's review what are these 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)
```

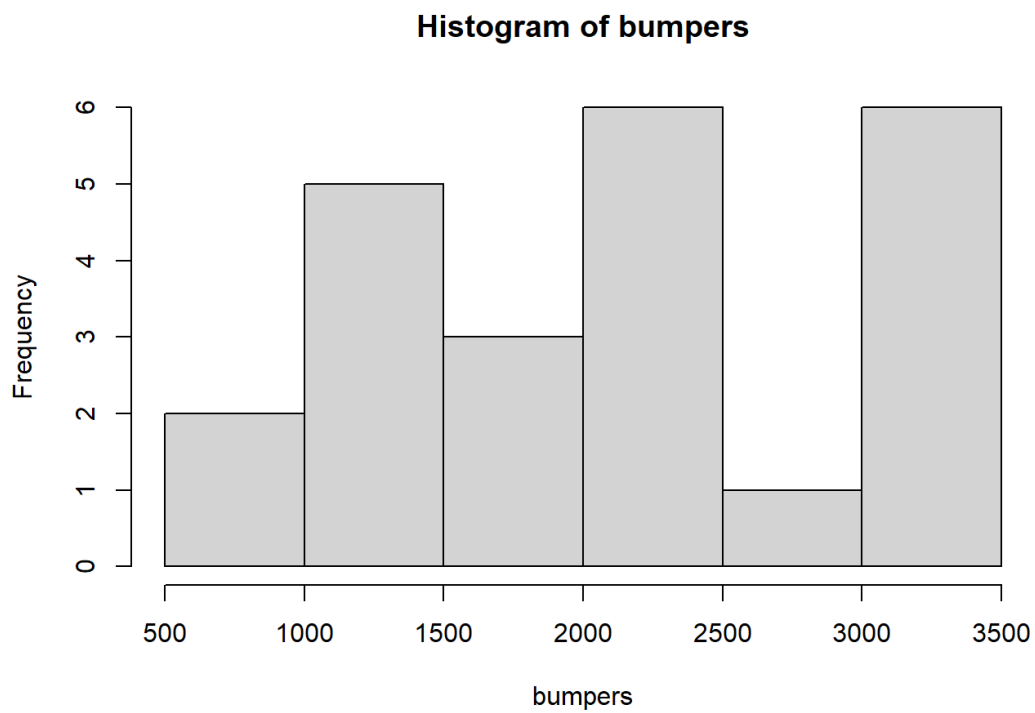
```
[1] 30 18 35 22 23 22
```

```
> head(math)
```

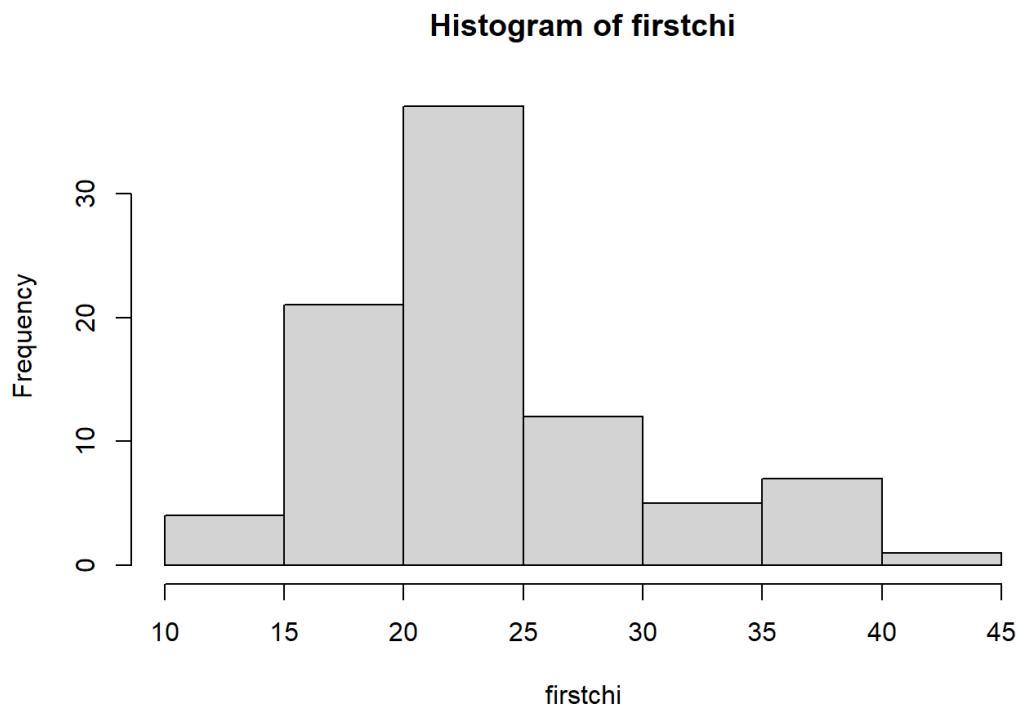
```
[1] 44 49 62 45 51 59
```

Make a histogram for every one of them.

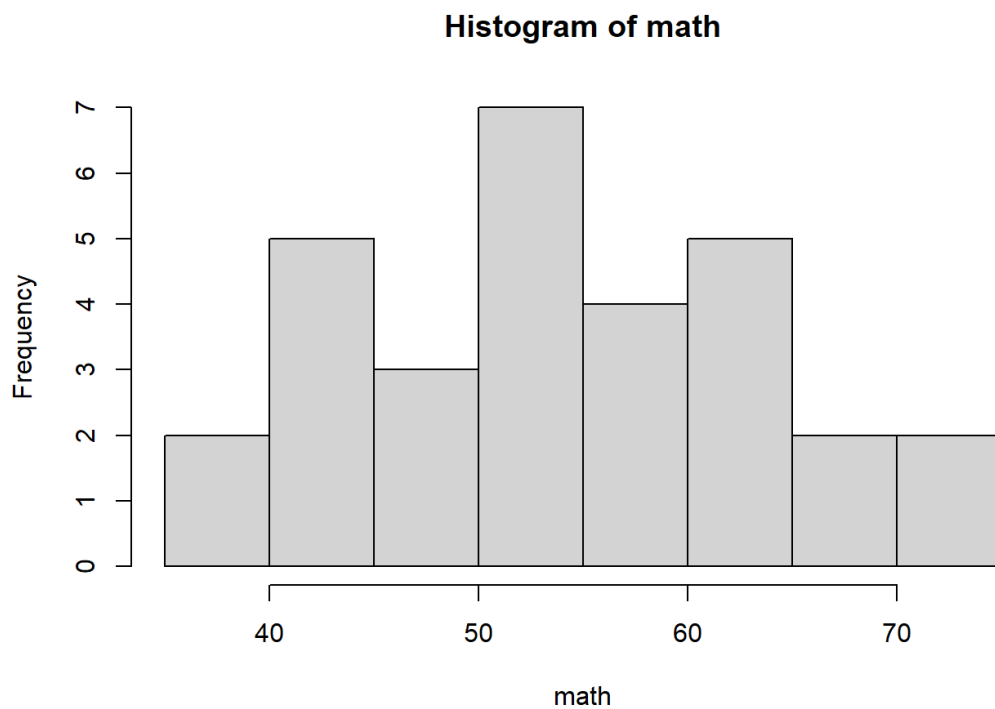
```
> hist(bumpers)
```



```
> 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

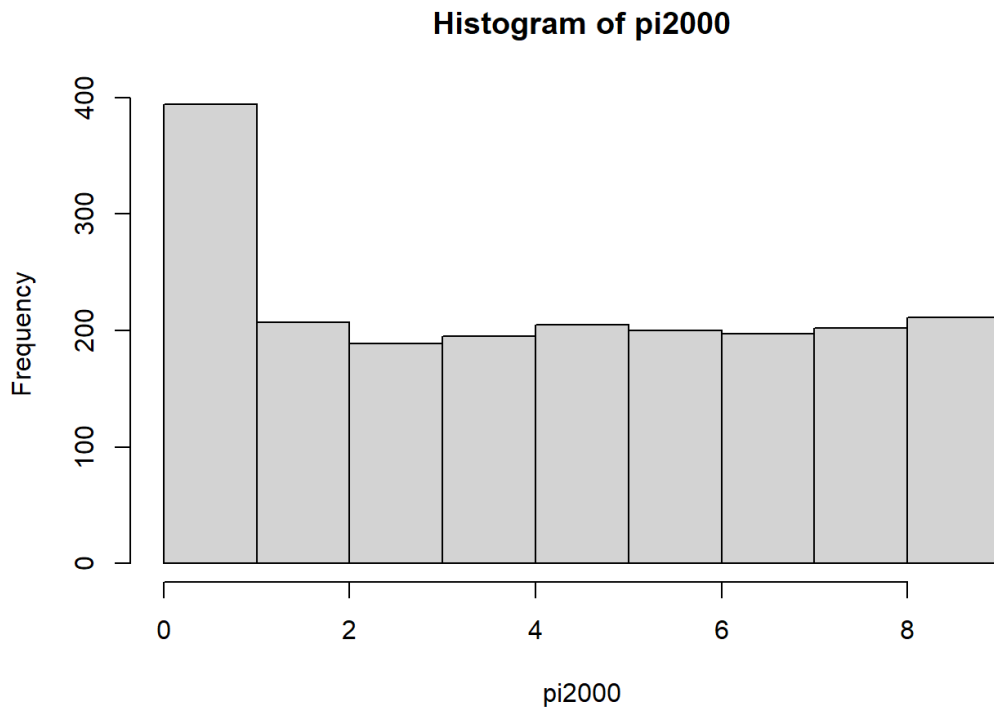
```
> summary(math)
```

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)
```

