hw 4

2022-10-20

```
setwd("~/Documents/GitHub/stats100")
```

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
## v ggplot2 3.3.6      v purrr   0.3.5
## v tibble  3.1.8      v dplyr   1.0.10
## v tidyr   1.2.1      v stringr 1.4.1
## v readr   2.1.3      v forcats 0.5.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(ggplot2)
library(scales)
```

```
##
## Attaching package: 'scales'
##
## The following object is masked from 'package:purrr':
##
##     discard
##
## The following object is masked from 'package:readr':
##
##     col_factor
```

```
library(RColorBrewer)
library(stats)
```

Column 1: height: The height of the student. Column 2: hsGPA: The high school GPA of the student. Column 3: pulse: The pulse rate of the student when measured in class.

```
students <- read.csv("student.csv")
students
```

```
##     height hsGPA pulse
## 1    70.00 3.200    27
## 2    62.00 3.930    64
## 3    72.00 3.840    60
## 4    68.50 3.800    72
```

```
## 5    68.00 3.850    60
## 6    70.00 3.480    80
## 7    70.00 3.300    60
## 8    60.00 3.800    71
## 9    74.00 3.300    76
## 10   68.00 3.840    80
## 11   73.00 3.300    92
## 12   71.00 3.300    56
## 13   69.00 3.200    70
## 14   66.00 3.750    75
## 15   68.00 3.200    76
## 16   66.00 3.900    80
## 17   66.00 3.600    80
## 18   73.00 2.800    50
## 19   63.00 3.600    60
## 20   71.00 3.980    77
## 21   66.00 3.800   100
## 22   69.00 3.800    60
## 23   68.00 3.500    60
## 24   75.00 3.200    64
## 25   66.00 4.000    64
## 26   68.00 3.250   160
## 27   70.50 4.100    58
## 28   68.00 3.240    64
## 29   62.00 3.800    54
## 30   70.00 3.980    80
## 31   68.00 3.630    78
## 32   62.00 3.600    78
## 33   72.00 3.300    80
## 34   66.00 3.500    72
## 35   66.50 3.980   100
## 36   62.00 3.900    80
## 37   70.00 3.800    68
## 38   72.00 4.000    80
## 39   70.00 3.980    70
## 40   67.00 2.900    68
## 41   69.00 3.300    80
## 42   65.00 4.000    80
## 43   58.50 3.830    78
## 44   63.00 4.040    63
## 45   68.00 3.750    90
## 46   72.00 3.600    55
## 47   64.00 3.967    74
## 48   69.00 3.500    75
## 49   71.00 3.500   100
## 50   63.00 3.860    64
## 51   71.00 3.500    70
## 52   72.00 3.690    72
## 53   80.00 3.200    60
## 54   66.00 4.000    64
## 55   66.00 3.780    70
## 56   67.00 3.700    78
## 57   68.00 3.890    65
## 58   60.00 3.900    72
```

```
## 59   68.75 3.980    90
## 60   73.00 3.500    65
## 61   66.00 3.560    60
## 62   74.00 3.300    72
## 63   69.00 3.900    66
## 64   72.00 2.700    87
## 65   73.00 3.700    84
## 66   68.00 4.000    85
## 67   69.00 3.600    72
## 68   64.00 3.800    48
## 69   72.00 2.750    96
## 70   62.00 3.780    45
## 71   64.00 3.900    48
## 72   65.50 3.300    70
## 73   56.00 4.200    50
## 74   63.00 3.980    68
## 75   71.00 3.330    92
## 76   65.00 3.200    72
## 77   73.00 3.300    80
## 78   67.00 3.600    70
## 79   72.00 3.400    78
## 80   64.00 3.990    70
## 81   72.00 3.400    70
## 82   69.00 3.300    68
## 83   67.00 3.000    80
## 84   71.00 3.500    88
## 85   65.00 3.000    70
## 86   64.00 3.800    76
## 87   75.00 3.300    70
## 88   61.00 3.985   104
## 89   66.00 4.000    95
## 90   76.00 3.900    60
## 91   67.00 3.800   100
## 92   74.00 4.000    72
## 93   66.00 3.800    76
## 94   70.00 3.720    70
## 95   73.00 3.350    80
## 96   61.00 3.800    72
## 97   66.00 3.800    90
## 98   65.00 3.750    60
## 99   75.00 3.970    65
## 100  63.00 3.400    70
## 101  65.00 3.860    80
## 102  73.00 3.900    55
## 103  67.00 3.900    96
## 104  64.00 3.800    52
## 105  72.00 3.780    60
## 106  64.00 4.000    65
## 107  65.00 3.500    29
## 108  69.50 3.300    60
## 109  66.00 3.800    85
## 110  68.00 3.400    64
## 111  72.00 3.850    68
## 112  70.00 3.780    58
```

```
## 113  65.00 3.750    69
## 114  62.00 4.000   126
## 115  55.00 3.800    85
## 116  70.00 3.500    75
## 117  68.00 3.750    76
## 118  66.00 3.670    72
## 119  72.00 2.980    84
## 120  66.00 4.000   160
## 121  65.00 3.650    72
## 122  75.00 3.500    90
## 123  74.00 3.300    80
## 124  74.00 3.000    60
## 125  71.00 2.600    70
## 126  72.00 3.850    68
## 127  72.00 3.800    72
## 128  69.00 3.750    79
## 129  72.00 3.500    60
## 130  62.00 4.200    68
## 131  64.00 3.840    80
## 132  64.00 3.760    82
## 133  70.00 4.000    64
## 134  66.00 3.820    90
## 135  64.00 3.800    80
## 136  65.00 3.980   100
## 137  67.00 3.750    50
## 138  64.00 3.900    76
## 139  65.00 3.890   120
## 140  68.00 3.700    60
## 141  60.00 3.700    72
## 142  68.00 3.600   132
## 143  67.00 3.000    69
## 144  70.00 3.870    42
## 145  67.00 4.500    56
## 146  63.00 3.800    96
## 147  70.00 3.490   120
## 148  74.00 3.900    60
## 149  73.00 3.500    60
## 150  71.00 3.900    50
## 151  70.00 3.400    70
## 152  66.50 3.500   100
## 153  66.00 4.000    55
## 154  60.00 3.090    77
## 155  65.00 3.650   100
## 156  74.00 3.000    82
## 157  66.00 3.900   110
## 158  70.50 3.200    78
## 159  68.00 3.800   100
## 160  67.00 3.700    65
## 161  67.00 3.700    88
## 162  68.00 3.870    72
## 163  63.00 3.800    90
## 164  68.00 3.500    60
## 165  64.00 3.830    67
## 166  72.00 3.720    76
```

```
## 167  73.00 3.670    76
## 168  73.00 3.500    84
## 169  69.00 3.890    60
## 170  68.00 4.000    70
## 171  65.00 3.700   100
## 172  70.00 3.900    66
## 173  65.00 3.700    96
## 174  65.00 3.800    80
## 175  64.00 3.600    88
## 176  68.00 3.780    72
## 177  63.00 3.942    60
## 178  70.00 4.210    84
## 179  69.00 3.500    72
## 180  70.00 3.460    55
## 181  67.00 3.800    78
## 182  64.50 3.400    98
## 183  72.00 3.400    68
## 184  65.00 3.900    65
## 185  74.00 2.700    60
## 186  73.00 3.500    76
## 187  71.50 3.500    70
## 188  69.00 3.980    78
## 189  68.50 3.600    96
## 190  69.00 3.900    70
## 191  60.00 3.500    72
## 192  78.00 3.830    80
## 193  72.00 3.500    68
## 194  69.00 3.900    74
## 195  74.00 3.800    60
## 196  66.00 3.870    62
## 197  74.00 3.800    90
## 198  68.00 3.600    80
## 199  64.00 3.550    83
## 200  71.00 3.500    70
```

```
summary(students)
```

```
##      height          hsGPA           pulse
##  Min.   :55.00   Min.   :2.600   Min.   : 27.00
##  1st Qu.:65.00   1st Qu.:3.500   1st Qu.: 64.00
##  Median :68.00   Median :3.750   Median : 72.00
##  Mean   :67.99   Mean   :3.653   Mean   : 74.83
##  3rd Qu.:71.00   3rd Qu.:3.890   3rd Qu.: 80.00
##  Max.   :80.00   Max.   :4.500   Max.   :160.00
```

#(a) Using R, find the 95% confidence interval for theaverage students height. (Confidence interval for a mean)

```
t.test(students$height, conf.level = 0.95)
```

```
##
##  One Sample t-test
```

```
##
## data:  students$height
## t = 234.13, df = 199, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  67.4186 68.5639
## sample estimates:
## mean of x
##  67.99125
```

#(b) What is the highest average height you expect a student to have, based on the confidence interval from (a)?

The upper bound of the confidence interval, which is 68.5639

#(c) Using R, find the 99% confidence interval for the average students pulse.

```
t.test(students$pulse, conf.level = 0.99)
```

```
##
##  One Sample t-test
##
## data:  students$pulse
## t = 60.055, df = 199, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0
## 99 percent confidence interval:
##  71.5894 78.0706
## sample estimates:
## mean of x
##     74.83
```

#(d) What is the lowest average pulse you expect a student to have, based on the confidence interval from (c)?

The lower bound of the confidence interval, which is 71.5894