Stat 202 Homework #5 Section Carver-004

1.42 The density of the earth. In 1798 the English scientist Henry Cavendish measured the density of the earth by careful work with a torsion balance. The variable recorded was the density of the earth as a multiple of the density of water. Here are Cavendish's 29 measurements.[22]

5.50	5.61	4.88	5.07	5.26	5.55	5.36	5.29	5.58	5.65
5.57	5.53	5.62	5.29	5.44	5.34	5.79	5.10	5.27	5.39
5.42	5.47	5.63	5.34	5.46	5.30	5.75	5.68	5.85	

Present these measurements graphically by either a stemplot or a histogram and explain the reason for your choice. Then briefly discuss the main features of the distribution. In particular, what is your estimate of the density of the earth based on these measurements?
DATA EARTHDENSITY

1.96 The density of the earth. Henry Cavendish (see Exercise 1.42, page 27) used $\bar{x}$ to summarize his 29 measurements of the density of the earth.

(a) Find $\bar{x}$ and s for his data.

(b) Cavendish recorded the density of the earth as a multiple of the density of water. The density of water is almost exactly 1 gram per cubic centimeter, so his measurements have these units. In American units, the density of water is 62.43 pounds per cubic foot. This is the weight of a cube of water measuring 1 foot (that is, 30.48 cm) on each side. Express Cavendish's first result for the earth (5.50 g/cm^3) in pounds per cubic foot. Then find $\bar{x}$ and s in pounds per cubic foot.

1.42. The stemplot gives more information than a histogram (since all the original numbers can be read off the stemplot), but both give the same impression. The distribution is roughly symmetric with one value (4.88) that is somewhat low. The center of the distribution is between 5.4 and 5.5 (the median is 5.46, the mean is 5.448); if asked to give a single estimate for the "true" density of the earth, something in that range would be the best answer.

48	8
49	
50	7
51	0
52	6799
53	04469
54	2467
55	03578
56	12358
57	59
58	5

1.96. **(a)** $\bar{x} = 5.4479$ and $s = 0.2209$. **(b)** The first measurement corresponds to $5.50 \times 62.43 = 343.365$ pounds per cubic foot. To find $\bar{x}_{\text{new}}$ and s_{new}, we similarly multiply by 62.43: $\bar{x}_{\text{new}} \doteq 340.11$ and $s_{\text{new}} \doteq 13.79$.

Note: *The conversion from cm to feet is included in the multiplication by 62.43; the step-by-step process of this conversion looks like this:*

$$(1\ g/cm^3)(0.001\ kg/g)(2.2046\ lb/kg)(30.48^3\ cm^3/ft^3) = 62.43\ lb/ft^3$$