

Homework #5

Stat 202


1.68 Longleaf pine trees. The Wade Tract in Thomas County, Georgia, is an old-growth forest of longleaf pine trees (*Pinus palustris*) that has survived in a relatively undisturbed state since before the settlement of the area by Europeans. A study collected data about 584 of these trees.²⁷ One of the variables measured was the diameter at breast height (DBH). This is the diameter of the tree at

4.5 feet and the units are centimeters (cm). Only trees with DBH greater than 1.5 cm were sampled. Here are the diameters of a random sample of 40 of these trees:

 LONGLEAF

10.5	13.3	26.0	18.3	52.2	9.2	26.1	17.6	40.5	31.8
47.2	11.4	2.7	69.3	44.4	16.9	35.7	5.4	44.2	2.2
4.3	7.8	38.1	2.2	11.4	51.5	4.9	39.7	32.6	51.8
43.6	2.3	44.6	31.5	40.3	22.3	43.3	37.5	29.1	27.9

- Find the five-number summary for these data.
- Make a boxplot.
- Make a histogram.
- Write a short summary of the major features of this distribution. Do you prefer the boxplot or the histogram for these data?

1.100  **Changing units from centimeters to inches.** Refer to Exercise 1.68. Change the measurements from centimeters to inches by multiplying each value by 0.39. Answer the questions from the previous exercise and explain the effect of the transformation on these data.

1.109 Sketch some normal curves.

- Sketch a normal curve that has mean 10 and standard deviation 3.
- On the same x axis, sketch a normal curve that has mean 20 and standard deviation 3.
- How does the normal curve change when the mean is varied but the standard deviation stays the same?

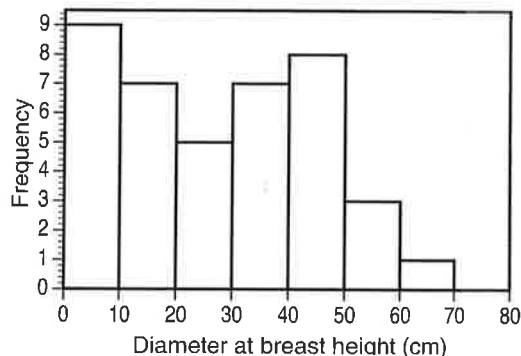
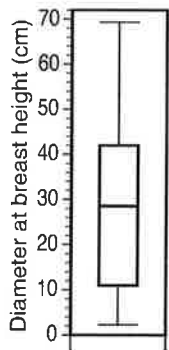
1.110 The effect of changing the standard deviation.

- Sketch a normal curve that has mean 10 and standard deviation 3.
- On the same x axis, sketch a normal curve that has mean 10 and standard deviation 1.
- How does the normal curve change when the standard deviation is varied but the mean stays the same?

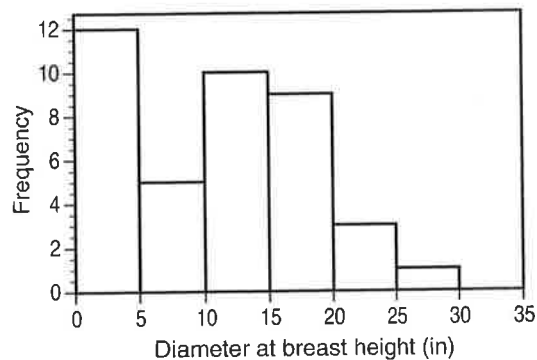
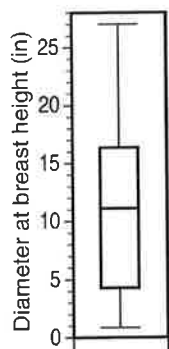
1.111 Know your density. Sketch density curves that might describe distributions with the following shapes:

- Symmetric, but with two peaks (that is, two strong clusters of observations).
- Single peak and skewed to the left.

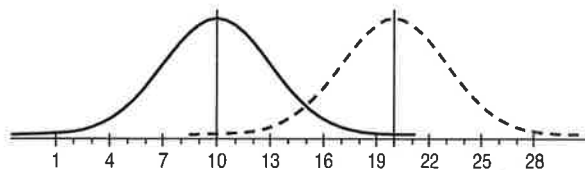
1.68. (a) The five-number summary is $\text{Min} = 2.2 \text{ cm}$, $Q_1 = 10.95 \text{ cm}$, $M = 28.5 \text{ cm}$, $Q_3 = 41.9 \text{ cm}$, $\text{Max} = 69.3 \text{ cm}$. (b) & (c) The boxplot and histogram are shown below. (Students might choose different interval widths for the histogram.) (d) Preferences will vary. Both plots reveal the right-skew of this distribution, but the boxplot does not show the two peaks visible in the histogram.



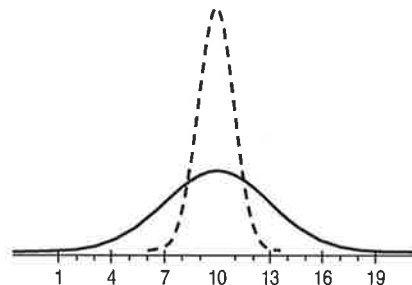
1.100. After changing the scale from centimeters to inches, the five-number summary values change by the same ratio (that is, they are multiplied by 0.39). The shape of the histogram might change slightly because of the change in class intervals. (a) The five-number summary (in inches) is $\text{Min} = 0.858$, $Q_1 = 4.2705$, $M = 11.115$, $Q_3 = 16.341$, $\text{Max} = 27.027$. (b) & (c) The boxplot and histogram are shown below. (Students might choose different interval widths for the histogram.) (d) As in Exercise 1.56, the histogram reveals more detail about the shape of the distribution.



1.109. Of course, student sketches will not be as neat as the curves on the right, but they should have roughly the correct shape. (a) It is easiest to draw the curve first, and then mark the scale on the axis. (b) Draw a copy of the first curve, with the peak over 20. (c) The curve has the same shape, but is translated left or right.



1.110. (a) As in the previous exercise, draw the curve first, and then mark the scale on the axis. (b) In order to have a standard deviation of 1, the curve should be 1/3 as wide, and three times taller. (c) The curve is centered at the same place (the mean), but its height and width change. Specifically, increasing the standard deviation makes the curve wider and shorter; decreasing the standard deviation makes the curve narrower and taller.



1.111. Sketches will vary.

