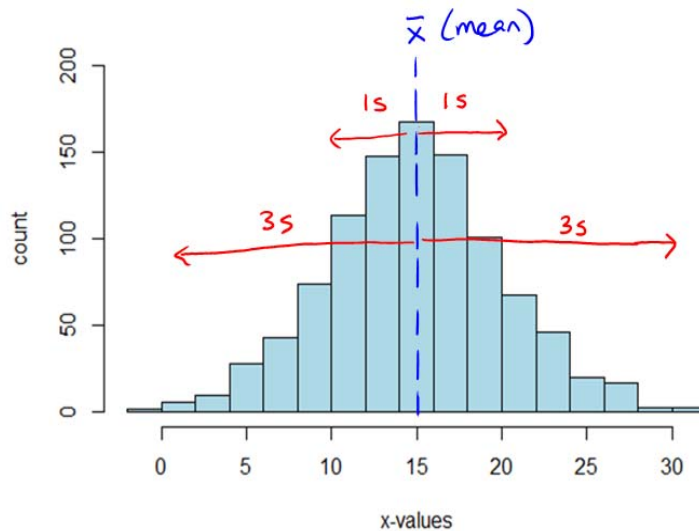


Math 189 – Standard Deviation

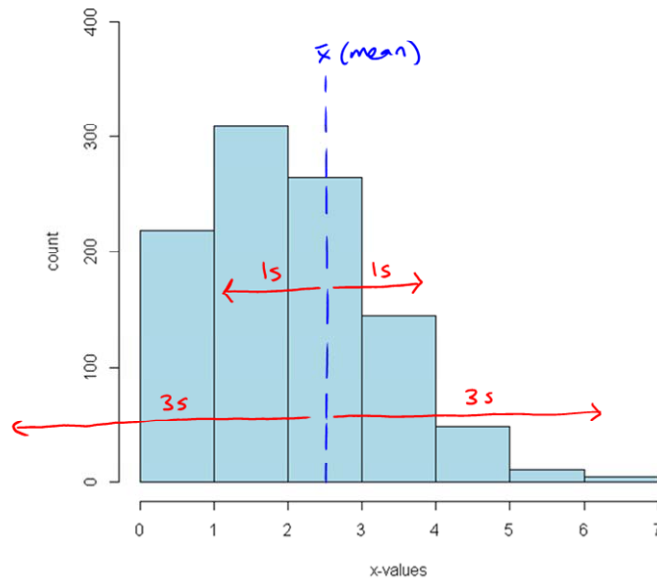
Suppose we have a population whose data is symmetrically distributed and unimodal. This data set has a mean \bar{x} of 15, a median of 15, and a standard deviation s of 5. You can see that the bulk of the measurements lie within one standard deviation of the mean, and almost all of them lie within three standard deviations from the mean.

Figure 1: A Symmetrical, Unimodal Distribution



Compare the previous histogram with the next one, which has an asymmetrical distribution with mean \bar{x} of 2.5 and standard deviation s of 1.4. Even though this one has considerable asymmetry (the median is 2), the bulk of the data still lies within one standard deviation of the mean, and virtually all of the data lies within three standard deviations of the mean.

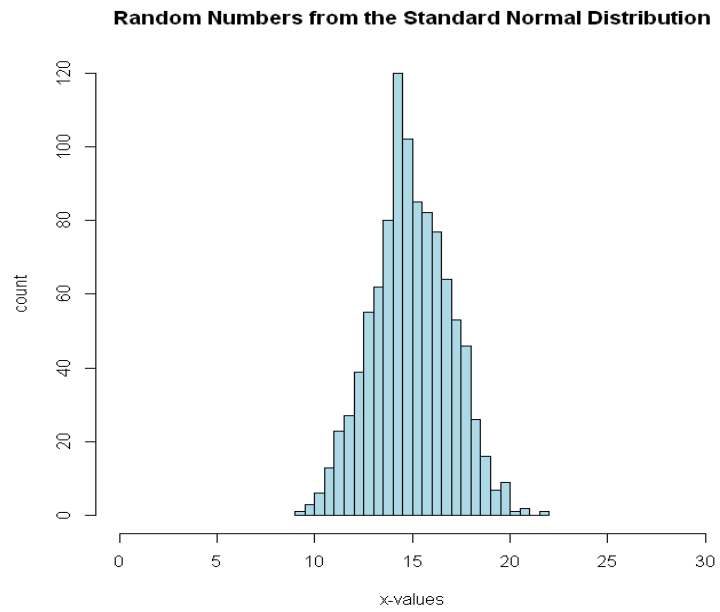
Figure 2: An Asymmetrical Distribution



Examples:

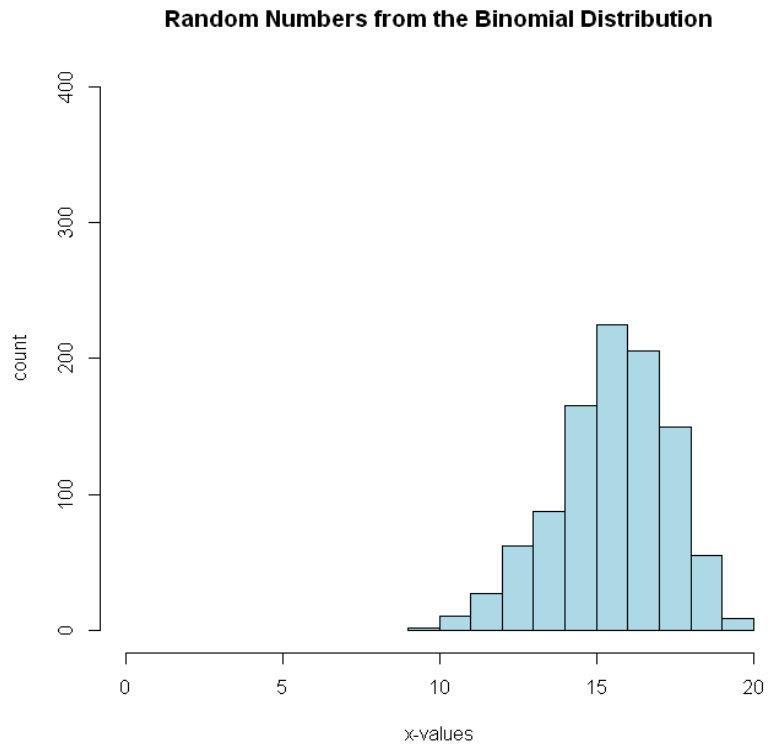
1. Consider the following histogram. Is the standard deviation equal to

- a) 0.5
- b) 2
- c) 15
- d) 20



2. Consider the following histogram. Is the standard deviation equal to

- a) 1
- b) 2
- c) 5
- d) 10
- e) 15
- f) 20



3. Pat, when entering quiz scores into her spreadsheet, accidentally put an extra zero on the end of one student's score (making it 380/40 instead of 38/40), and then calculated the mean, median, range, and standard deviation for the section. She then noticed her mistake and recalculated all of the quantities. For the following quantities, state whether the corrected value will be higher, lower, or the same as the value calculated with the incorrect quiz score:
- a) mean
 - b) median
 - c) range
 - d) standard deviation
4. Consider the following sets of data. Without calculating any values, state whether the standard deviation for Set 2 will be the same/higher/lower than that for Set 1.
- a) Set 1: 2, 3, 9, 16, 17 Set 2: 2, 8, 9, 10, 17
 - b) Set 1: 2, 3, 9, 16, 17 Set 2: 3, 4, 10, 17, 18
5. Tom is running a small business with five employees, including himself. The salaries of the five people (in thousands of dollars) are 30, 45, 50, 55, and 75, with Tom making the highest salary.
- a) if Tom gives everyone a \$2000 bonus, what happens to the mean, median, range, and standard deviation?
 - b) if Tom gives everyone a 5% raise, what happens to the mean, median, range, and standard deviation?
 - c) if Tom decides to keep everyone else's salary the same, but raise his own salary by \$10,000, what happens to the mean, median, range, and standard deviation?