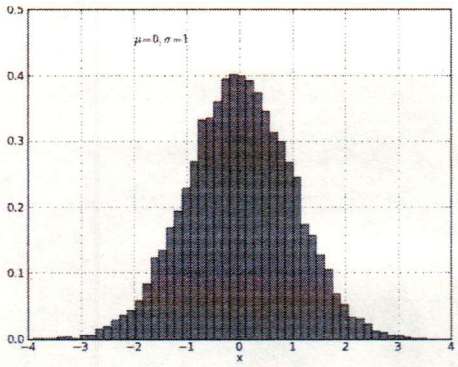
9.1 What Is Normal?

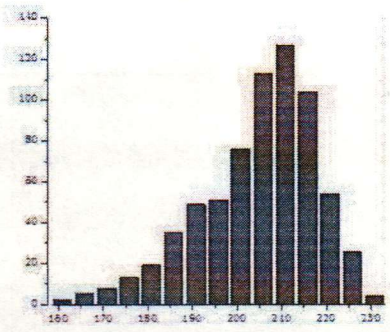
A Develop Understanding Task

One very important type of data distribution is called a "normal distribution." In this case, the word "normal" has a special meaning for statistical distributions. In this task, you will be given pair of data distributions represented with histograms and distribution curves. In each pair, one distribution is normal and one is not. Your job is to compare each of the distributions given and come up with a list of features for normal distributions.

1. This is approximately normal:



This is not:

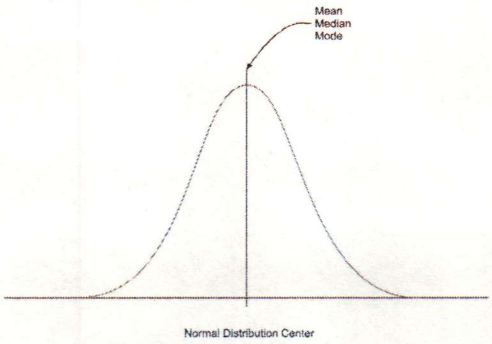


What differences do you see between these distributions?

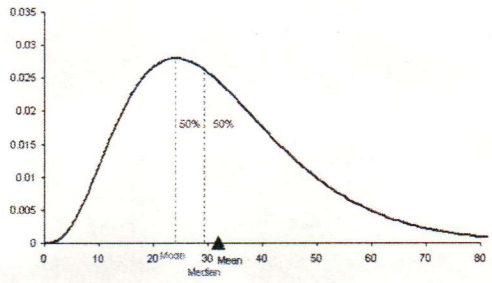
- Symmetrical
- peak is in the middle

- Skewed left
- peak is on the right.

2. This is normal:



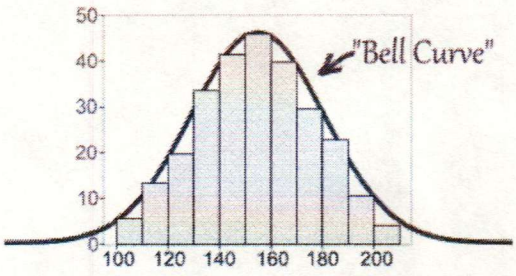
This is not:



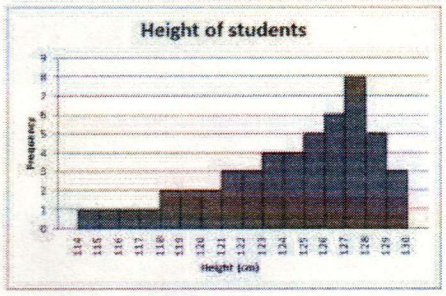
What differences do you see between these distributions?

- mean = median = mode
- mode ≠ mean ≠ median
- skewed right

3. This is approximately normal:



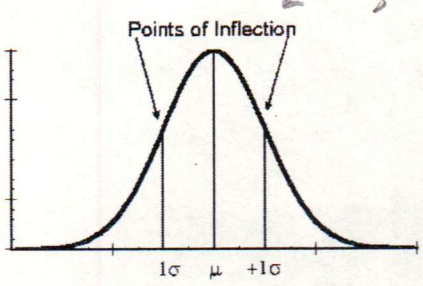
This is not:



What differences do you see between these distributions?

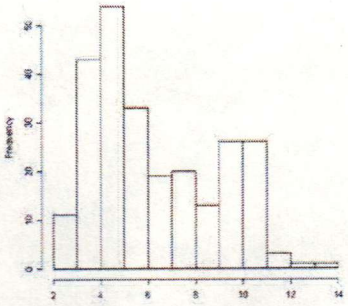
- Symmetric
- bell curve
- skewed left
- no bell curve

4. This is normal:



← where the slope changes

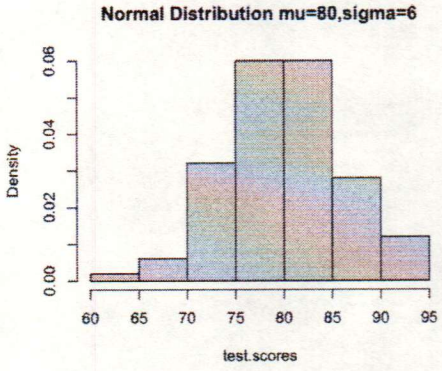
This is not:



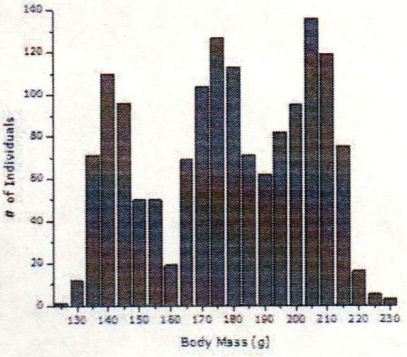
What differences do you see between these distributions?

- unimodal
- bimodal (two peaks)

5. This is approximately normal:



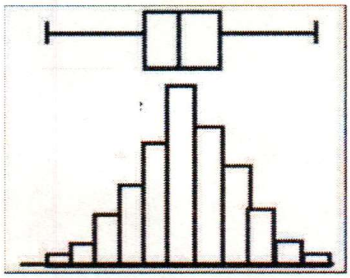
This is not:



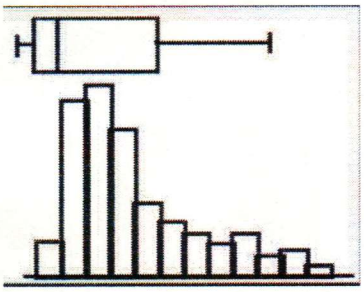
What differences do you see between these distributions?

- unimodal
- symmetric
- multimodal

6. This is approximately normal:



This is not:

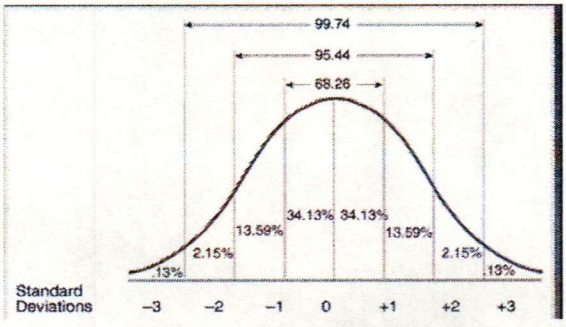


What differences do you see between these distributions?

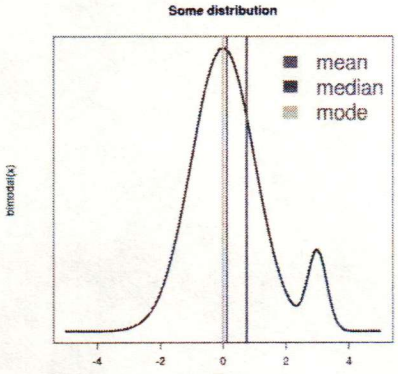
- unimodal, symmetric
- box is small; whiskers are long

unimodal, skewed right

7. This is normal:



This is not:



What differences do you see between these distributions?

- symmetrical

- bimodal
- mean ≠ median ≠ mode

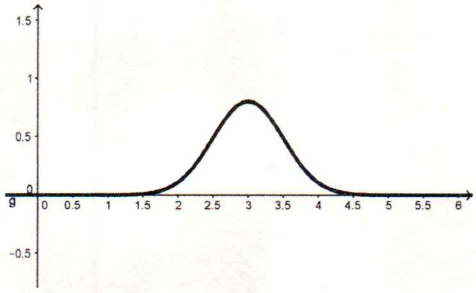
8. Based upon the examples you have seen in #1-7, what are the features of a normal distribution?

- Symmetric
- unimodal (single peak)
- bell curve shape
- mean = median = mode

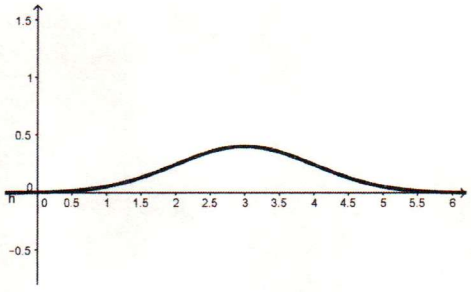
9. a. What does the standard deviation tell us about a distribution?

b. Each of the distributions shown below are normal distributions with the same mean but a different standard deviation.

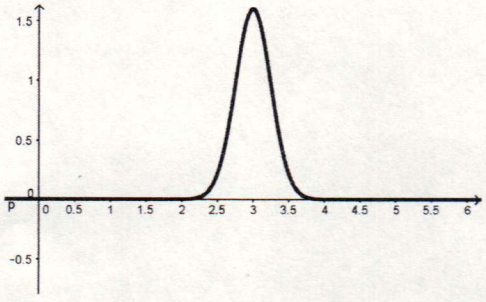
Mean = 3, Standard Deviation = 0.5



Mean = 3, Standard Deviation = 1



Mean = 3, Standard Deviation = 0.25



How does changing the standard deviation affect a normal curve? Why does it have this effect?

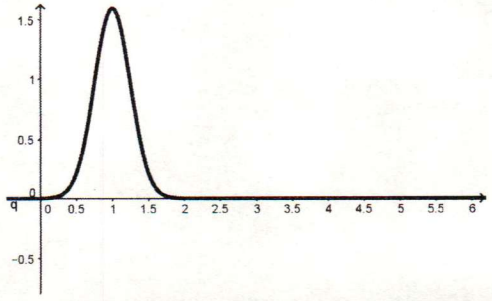
Standard deviation determines the height and width

smaller = taller & skinnier bigger = shorter and wider

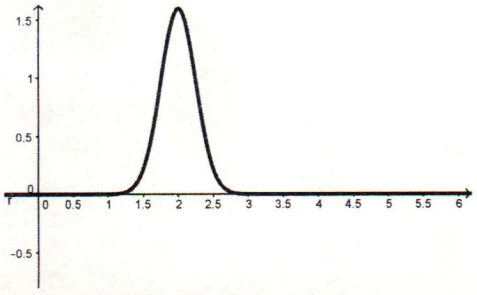
10. a. What does the mean tell us about a distribution?

b. Each of the distributions shown below are normal distributions with the same standard deviation but a different mean.

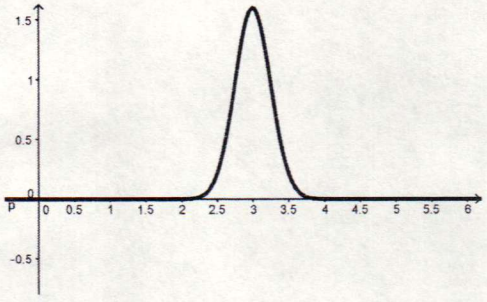
Mean = 1, Standard Deviation = 0.25



Mean = 2, Standard Deviation = 0.25



Mean = 3, Standard Deviation = 0.25



How does changing the mean affect a normal curve? Why does it have this effect?

The mean determines where the peak is on the X-axis.

11. Now that you have figured out some of the features of a normal distribution, determine if the following statements are true or false. In each case, explain your answer.

a. A normal distribution depends on the mean and the standard deviation.

True/False Why? The mean determines where the peak is, the standard deviation determines the height & width.

b. The mean, median, and mode are equal in a normal distribution.

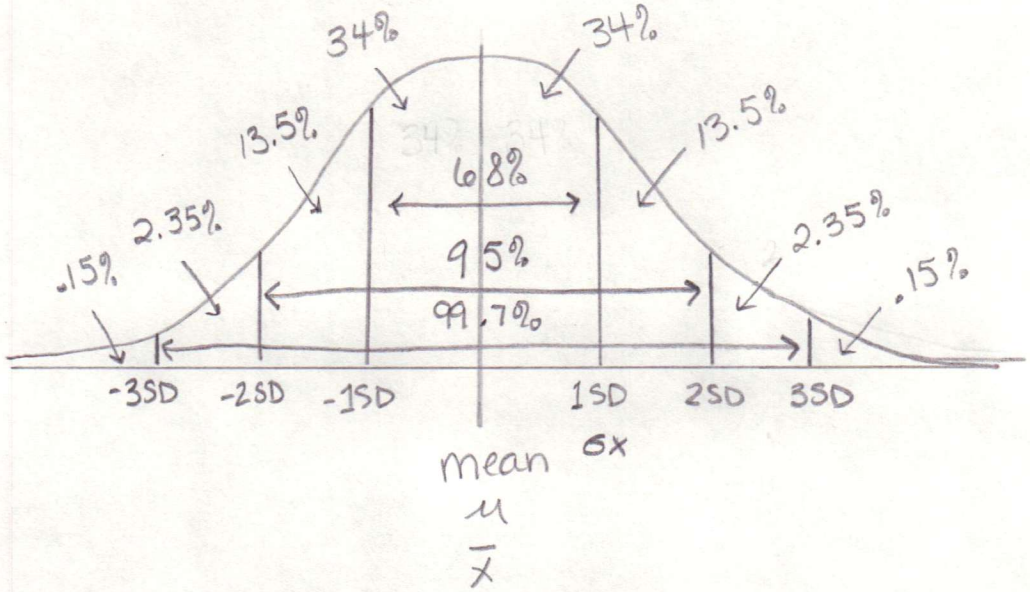
True/False Why? That is why it is symmetric

c. A normal distribution is bimodal.

True/False Why? It is unimodal or only has one peak.

d. In a normal distribution, exactly 50% of the population is within one standard deviation of the mean.

True/False Why? 68% of the population is within one standard deviation



mean	median	mode
average	middle	most

measures of center

Make a list

[Stat] Edit [1] enter data

Clear a list

[Stat] Edit [4] [2nd] [Stat] choose list [enter]

Calculate data

[Stat] [▶] Calc [1] [enter] [enter] [enter]

↳ or change to a different list