

Get out your Unit 6 Outline and make sure your 6.8 - 6.13 HW is finished, it is all due today!

\*We are skipping Unit 7 and moving into Unit 8 today.

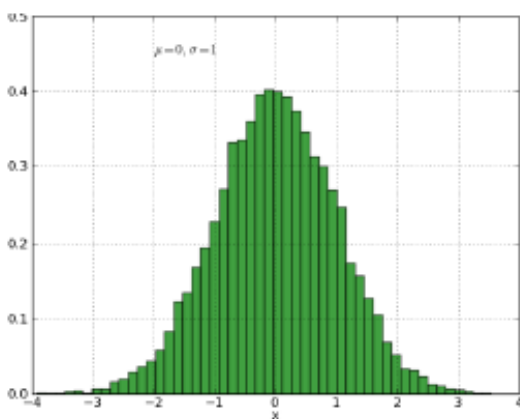
# 8.1 What is Normal?

## A Develop Understanding Task

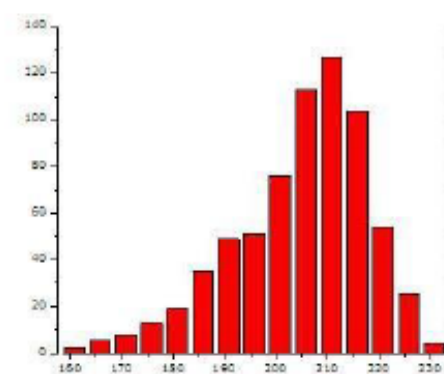
One very important type of data distribution is called a "normal distribution." In this case the word "normal". In this task, you will be given pair of data distributions represented with histograms and distribution curves. In each pair, one distribution is normal and one is not. Your job is to compare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



1. This is normal:



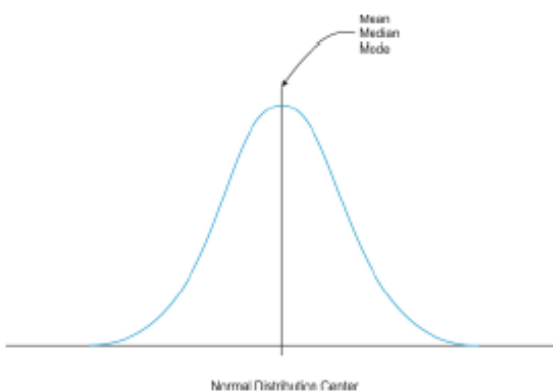
This is not:



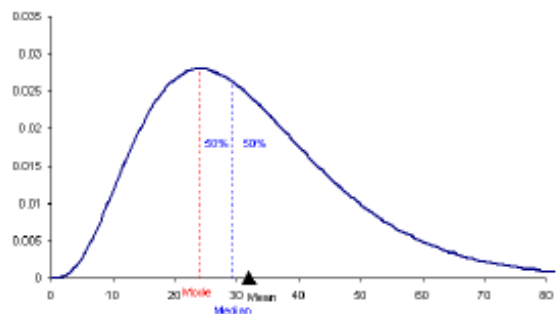
What differences do you see between these distributions?

*N.C. are symmetrical about the middle*

2. This is normal:



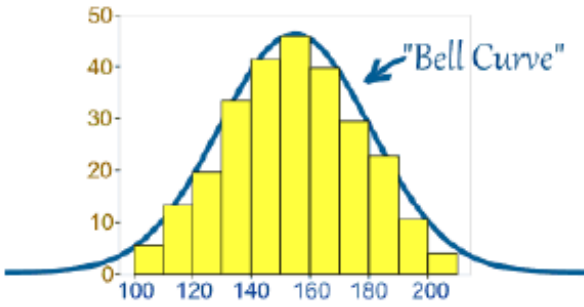
This is not:



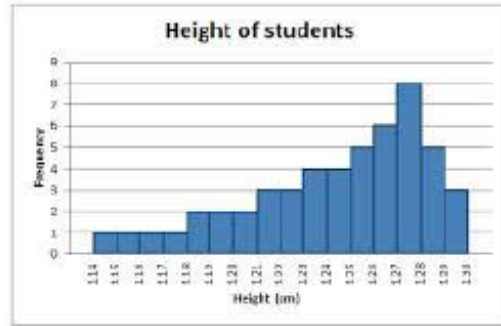
What differences do you see between these distributions?

*N.C. have same median, mode, mean & it's in the center.*

3. This is normal:



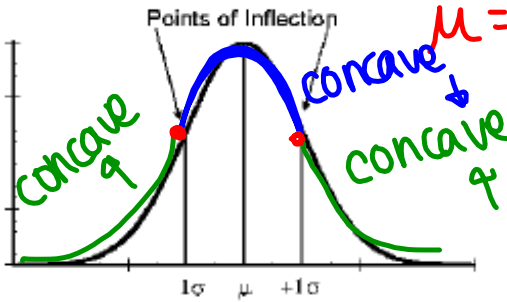
This is not:



What differences do you see between these distributions?

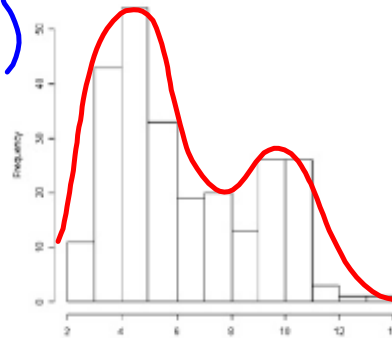
N.C. is also called a "bell curve" & is symmetrical.

4. This is normal:



$\sigma$  = standard deviation ( $s$ )  
 $\mu$  = mean ( $\bar{x}$ )

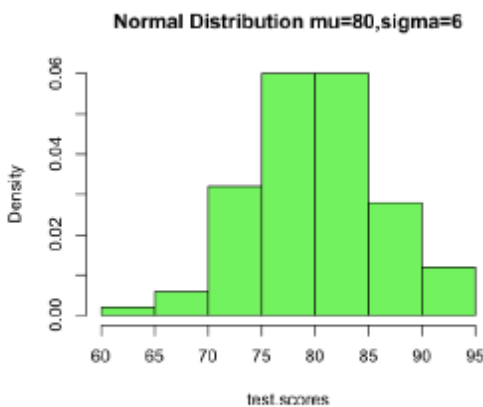
This is not:



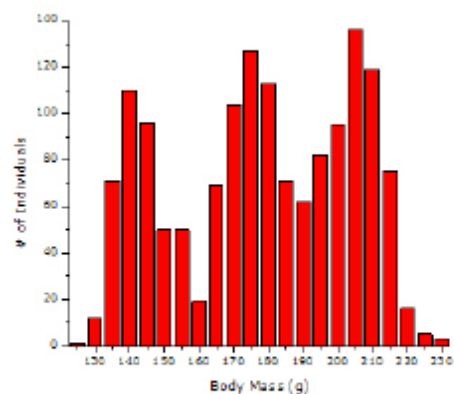
What differences do you see between these distributions?

Points of inflection  $\pm 1$  SD away from mean.

5. This is normal:



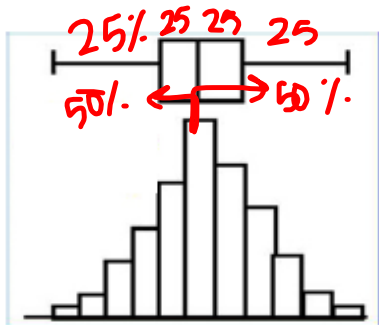
This is not:



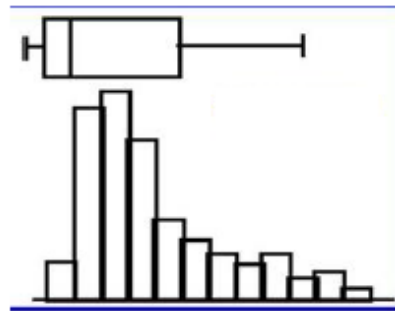
What differences do you see between these distributions?

High values in middle.

6. This is normal:



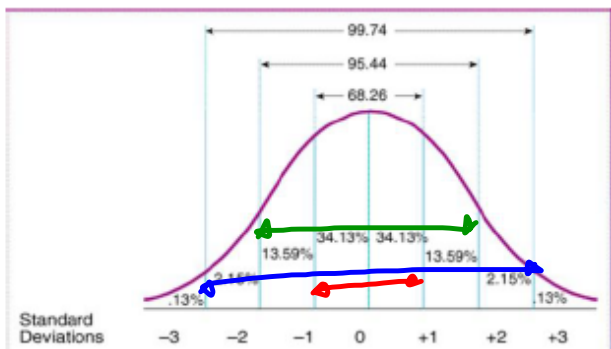
This is not:



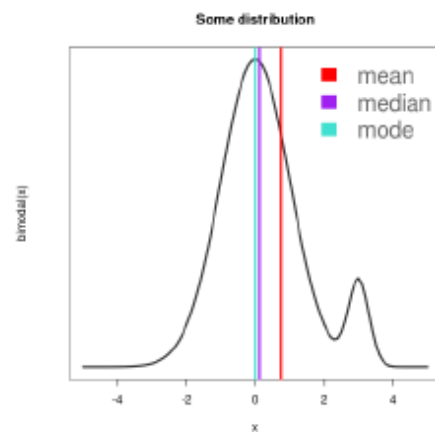
What differences do you see between these distributions?

Box & whisker plot evenly spaced

7. This is normal:



This is not:



What differences do you see between these distributions?

68-95-99.7 Rule  $\pm 1SD$  of mean 68% of data  
 $\pm 2SD$  of mean 95% of data  
 $\pm 3SD$  of mean 99.7% of data

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

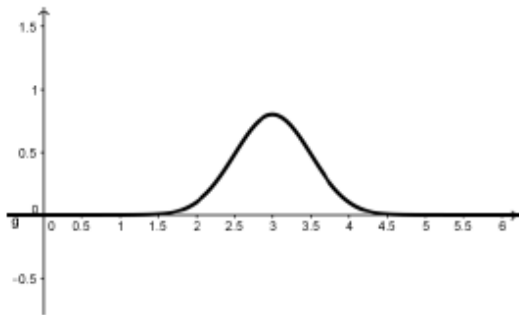
10. a. What does the standard deviation tell us about a distribution?

SD tells us how spread out the data is.

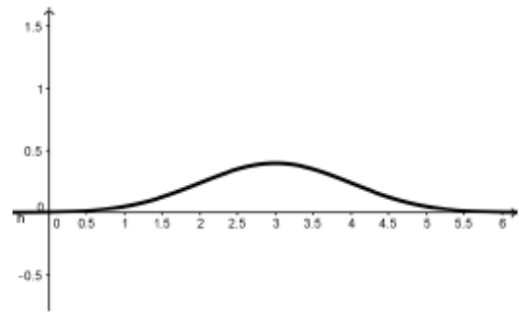


b. Each of the distributions shown below are normal distributions with the same mean but a different standard deviation.

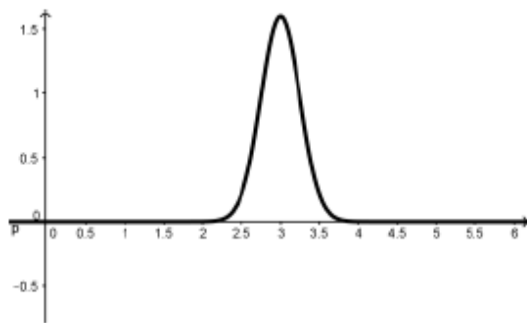
Mean = 3, Standard Deviation = 0.5



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?

Decreasing the SD makes the curve steeper & skinnier.

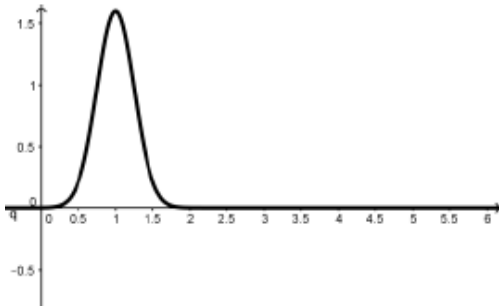
Increasing the SD makes the curve less steep & wider.

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

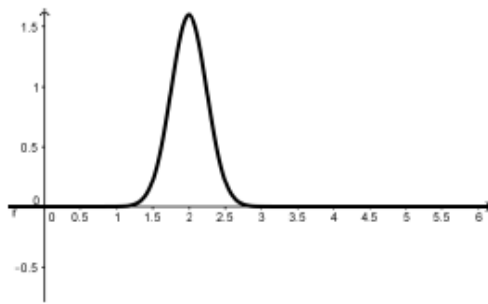
Mean is the middle in a normal distribution & also the highest.

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

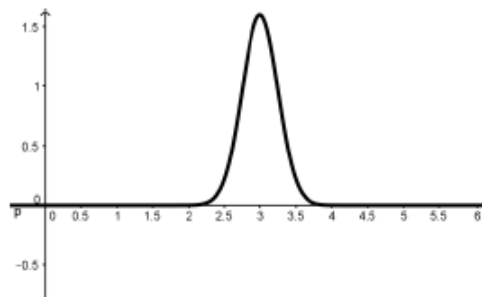
Mean = 1, Standard Deviation = 0.25



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?

It changes where the middle of the curve is along the x-axis.

12. 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? What the curve looks like depends on  $\mu$  (mean) and  $\sigma$  (SD)

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

True /  False Why?

c. A normal distribution is bimodal.

True /  False Why? Only one mode.

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

True /  False Why? 68%. not 50%.

# Homework

## Finish 8.1 "Ready, Set, Go"