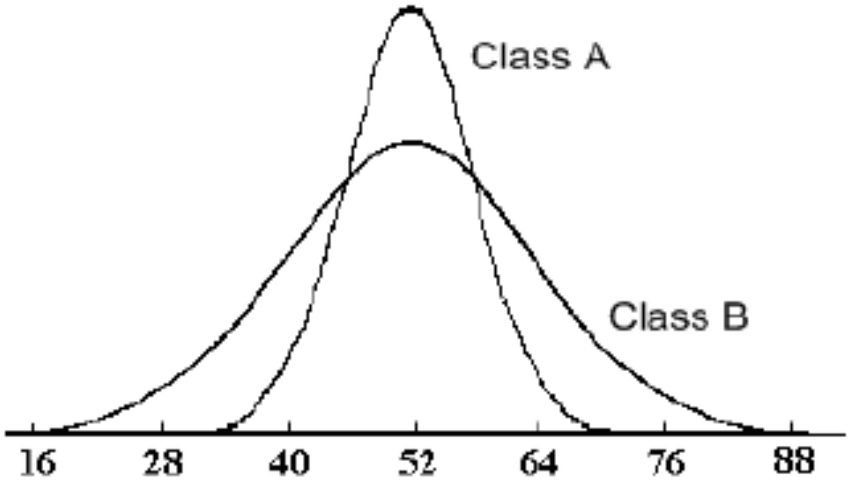
Math 2201 **Date:**_____

5.5A Comparing Normal Distributions

Comparing Sets of Normally Distributed Data

Example 1:
The graph below shows the scores on a standardized test, normally distributed, for two classes:



(A) What do these graphs have in common? How are they different?

Similar: both normally distributed, same mean, median & mode
Different: class B more spread out, class A is more clustered.
(higher σ) (lower σ)

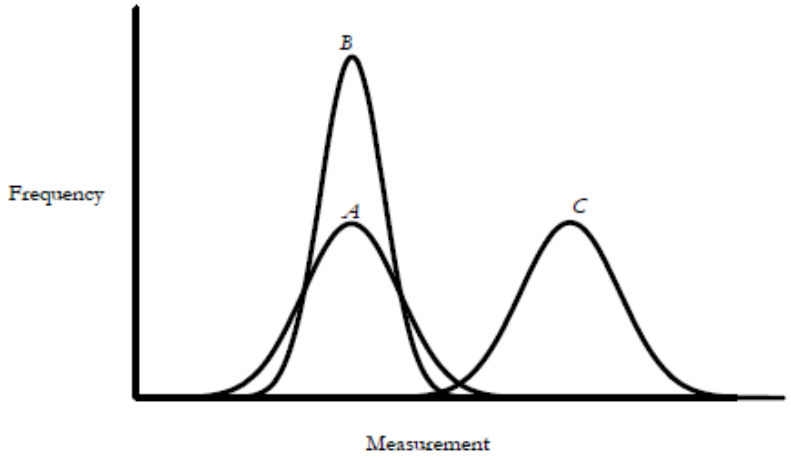
(B) Which graph has the greatest standard deviation? Why?

Graph B. It goes out further on the sides. Peak is not as high, which means fewer data points close to mean.

(C) If a student scored 42 on a test, which class are they most likely in? Explain your answer.

Class A. More of the data between 40 and 64, so it's more likely that a score of 42 would be in this class.

Example 2:
Answer the questions below on the following graphs:



(A) What do graphs A and B have in common? How are they different?

Common - Same mean, median & mode

different - A is more spread out and lower peak.

(B) What do graphs A and C have in common? How are they different?

Common - Same size and shape. Same or

differences - mean, median & mode.

(C) Is there any relationship between graphs B and C?

nothing common

(D) Which graph has the smallest standard deviation? Why?

Graph B. Highest peak, data more clustered around the mean.

(E) Why is the graph with the lowest standard deviation also the tallest?

Same as (D).

(F) Which graph has the greatest mean? How do you know?

Graph C. Mean is further to the right.

Example 3:
Sally has a height of 1.75 m and lives in a city where the average height is 1.60 m and the standard deviation is 0.20 m. Leah is 1.80 m and lives in a city where the average height is 1.70 m and the standard deviation is 0.15 m. Identify which of the two is considered to be taller compared to their fellow citizens. Explain your reasoning.

Leah would be taller compared to her fellow citizens. A lower σ, means more people are closer to the average height.

The examples that we have seen thus far, namely the normal distribution and normal curves, show the importance of data analysis and its implications in the real world. We can use this type of data analysis in the following situations:

- We may want to talk about particular scores within a set of data.
- We may want to tell other people about whether or not a score is above or below average.
- We may want to indicate how far away a particular score is from the average.
- We might also want to compare scores from different sets of data and figure out which score is better.

Limitations with using Normal Distributions and Normal Curves
We are restricted to dealing specifically with data values that are exactly one, two or three standard deviations from the mean. If a data point is not at ones of these locations, we can't really tell what percentages of data will be located below or above that data point.

Example 4:
On the normal distribution curve shown, we can only comment specifically on the points 45.3, 47.7, 50.1, 52.5, 54.9, 57.3 and 59.7, in terms of being able to identify the percentages of points with ranges between these.

If we wanted to know the percentage of data points that lie above or below a weight of 51.5 lb, we wouldn't be able to do so using the graph.

To do this, we need Z-scores!