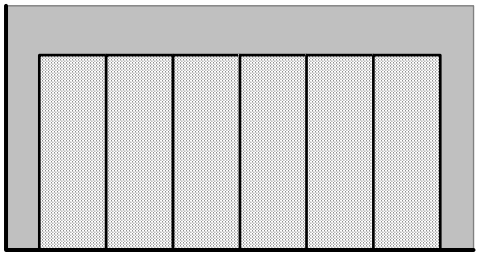
MGF 1106 Section 13.7

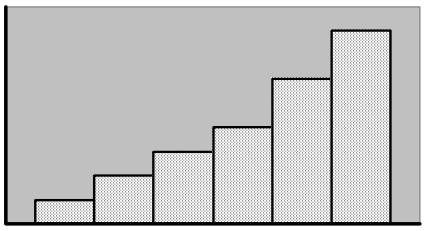
When data is organized into a frequency table and a histogram is made, some analysis of the data can be achieved directly from the graph. Some patterns of distribution seen frequently in these histograms are as follows:

Rectangular distribution:

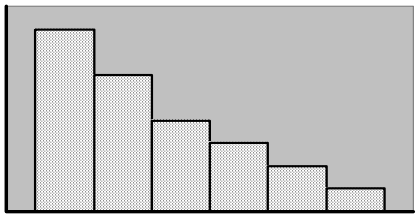


(occurrences of a number when a normal die is tossed)

J- shaped distribution:

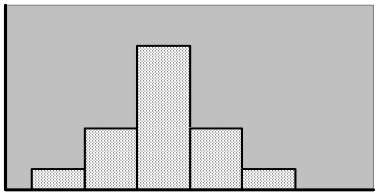


(scores on a very easy test)



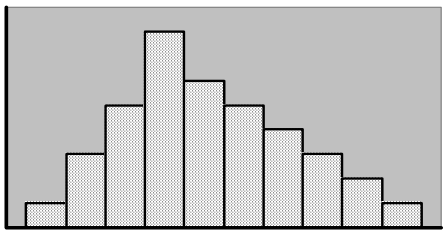
(scores on a very difficult test)

Normal distribution:
(Normal curve or bell curve)

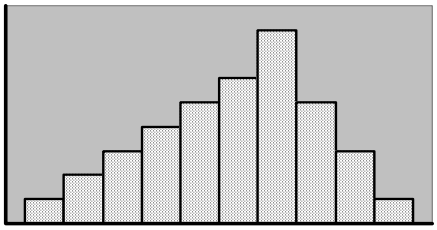


(scores on a "normal" test)

Skewed distribution:



Right side of the curve is stretched or skewed right



Left side of the curve is stretched or skewed left

CLAST: By examining the "curves" associated with data, the relationship between the mean, median and mode can be determined even when the original data values are unknown using the following process.

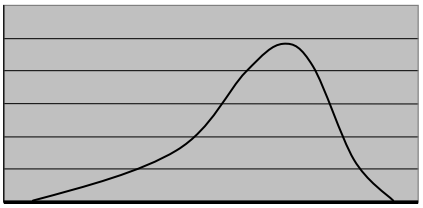
1. Draw three lines under the graph in the format:
   _____ < _____ < _____.
2. Write median on the middle line. (Median is always the middle number).
3. Write mode on the line underneath the highest point on the curve. (Mode is the data value that occurs MOST often.)
4. Write mean on the empty line.

NOTE: If the graph is a NORMAL curve, the middle value is the highest point. Thus median = mode = mean.

Examples: Fill in the three lines under each graph with mean, median and mode. Then match the six statements with the appropriate graph.

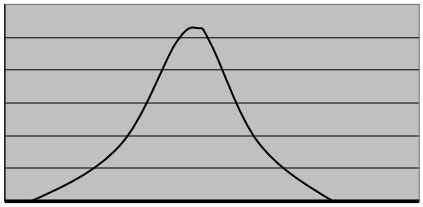
_____1. mean > median
_____2. mean < median
_____3. mean > mode
_____4. median = mode
_____5. mean < median < mode
_____6. mode < mean < median

A.



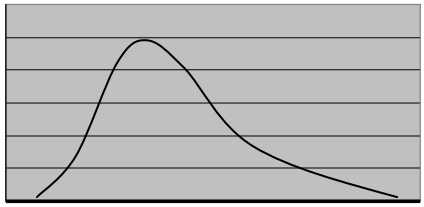
_____<_____<_____

B.



_____<_____<_____

C.



_____<_____<_____

CLAST: Given a general description of the data it is possible to make conclusions regarding mean, median and mode without actually calculating their values.

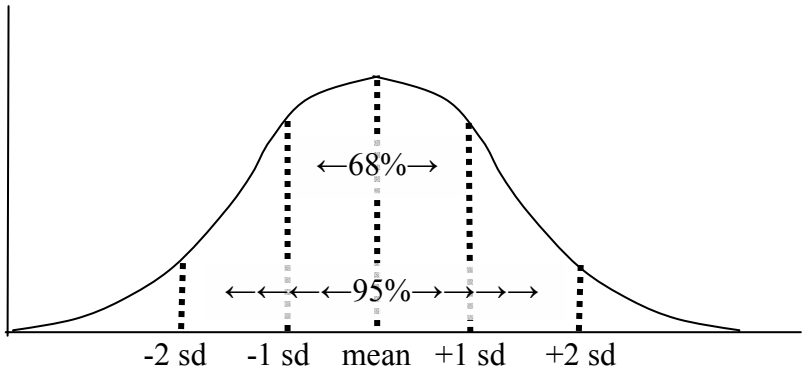
Example 1. Blake mows lawns to earn spending money. Twelve of his customers pay him $20, nine pay him $15, and one pays $10. Determine the relationship between the mean, median and mode.

Example 2: On a bird watching excursion, half of the children saw 8 different types of birds. Half of the remaining children was 10 birds, while the other half only saw 6. Determine the relationship between the mean, median and mode.

Example 3. On a physical fitness test, half of the students can run the obstacle course in 20 minutes. Most of the others take 22 minutes, but a few take 25 minutes. Determine the relationship between the mean, median and mode.

Using standard deviation in a **normal curve**.

A study of statistical data reveals that when a normal distribution occurs, 68% of the population will have a value within one standard deviation of the mean, and 95% of the population will have a value within two standard deviations of the mean.



This information can be used to analyze data when original values are unknown.

Example 1: Given that the scores on a test are normally distributed, that the mean score is 80 and the standard deviation is 7,

1. What percent scored less than 87?
2. What percent scored less than 73?
3. What percent scored more than 94?
4. 2.5% scored less than what value.

Example 2: Given the times required for a group of students to complete the physical fitness obstacle course result in a normal curve, and that the mean time 21 minutes and the standard deviation is 4,

1. What percent took longer than 29 minutes?
2. What percent took less than 29 minutes?
3. What percent took between 13 and 29 minutes?
4. What percent took between 13 and 25 minutes?
5. What percent took longer than 17 minutes?

MGF 1106 - Section 13.7 - STANDARD DEVIATION

1. A set of data with a normal distribution has a mean of 50 and standard deviation of 10.

_____ a. 68% of the data is between what two numbers?

_____ b. 95% of the data is between what two numbers?

2. A set of data with a normal distribution has a mean of 35 and standard deviation of 5.

_____ a. 68% of the data is between what two numbers?

_____ b. 95% of the data is between what two numbers?

_____ c. About what percent of the population (data) is above 40?

3. A set of data with a normal distribution has a mean of 16.4 and standard deviation of 3.2.

_____ a. 68% of the data is between what two numbers?

_____ b. 95% of the data is between what two numbers?

_____ c. What percent of the data is below 13.2?

4. A set of data with a normal distribution has a mean of 120 and standard deviation of 15.

_____ a. 2.5% of the data is above what value?

_____ b. 16% of the data is below what value?

_____ c. What percent of the data is above 135?

_____ d. What percent of the data is below 90?

5. Review:
Given data with mode = 70; mean = 54; median = 60; 1st quartile = 28; 3rd quartile = 71

_____ a. What percent of data is above 71?

_____ b. What value was the most common one?

_____c. 50% of the data was above what number?

_____ d. What value is the 2nd quartile?

Answers: 1. 40,60; 30,70; 2. 30,40; 25, 45; 16%; 3. 13.2, 19.6; 10, 22.8; 16%;
4. 150; 105; 16%; 2.5%; 5. 25%; 70; 60; 60