

Before we begin, are there any questions from last day's work?

Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) describe a "normal" distribution, and give an example.
- b) distinguish between a normal, skewed and bimodal distribution.

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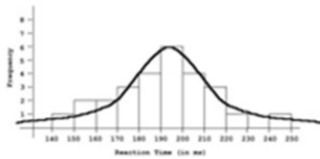
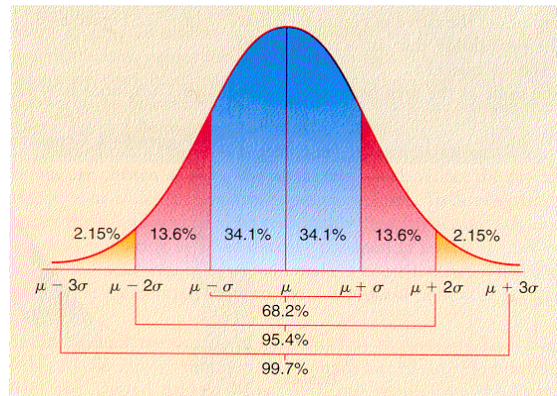
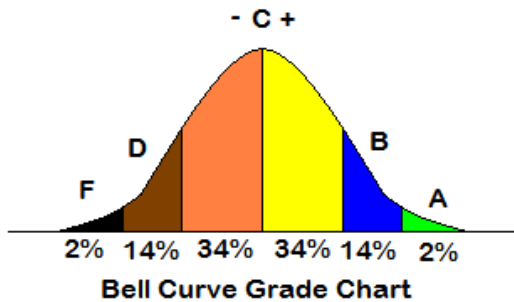


Figure 5. Theoretical normal distribution curve fitted to the empirical distribution (histogram).

Common Distributions



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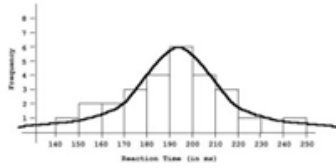


Figure 5. Theoretical normal distribution curve fitted to the empirical distribution (histogram).

Common Distributions

Recall: An outcome is the observable result from an experiment.

A distribution is a set of outcomes collected from an experiment. For example, the set of heights of students in our math class form a distribution, the results from flipping a coin hundreds of times etc...

As another example, this is a collection of interest rates (rounded to the nearest percent) taken from a sample of investments last year...

Interest Rates %	1	3	4	3	3	5	6	1	4	6	2	3	8	2	2	7	4	9	7	4	5	5	7
Interest Rates %	5	7	6	4	6	5	6	5	8	4	6	5	8	6	4	9	5	3	7	5	3	7	

Recall: The frequency of an item is how many times it occurs.

A frequency distribution is a set of outcomes, along with the frequency of each outcome:

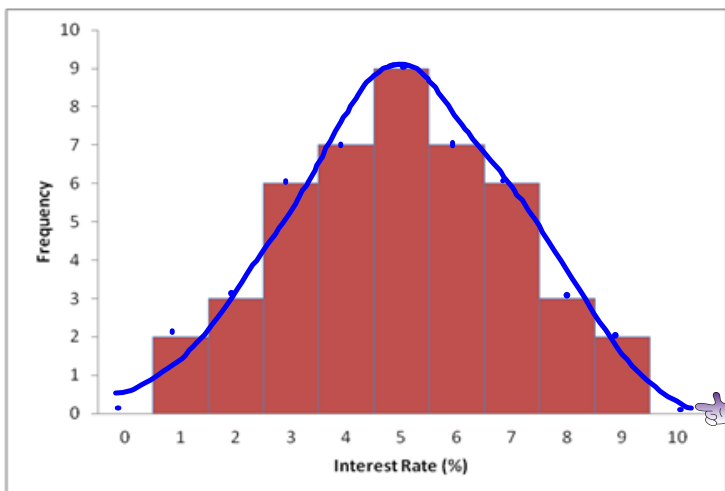
Interest Rates %	0	1	2	3	4	5	6	7	8	9	10
Frequency	0	2	3	6	7	9	7	6	3	2	0

3.1%, 3.2%, 3.44%, etc., are ALL in the "3" interval

Is interest rate data continuous or a discrete? Explain.

The interest rates are continuous, so 5.1, 5.2, 5.35, etc., are all in the "5" interval.

This is the graph of the above distribution of data:



What does the shape of this curve tell us about the interest rates from this sample?

The "bell curve" shape tells us that the data is distributed "symmetrically" about the mean.

The frequency distribution just created is a **normal distribution**.

A **normal distribution** has the following properties:

symmetric, unimodal, “bell-shaped”, and is a “smooth” continuous frequency distribution.

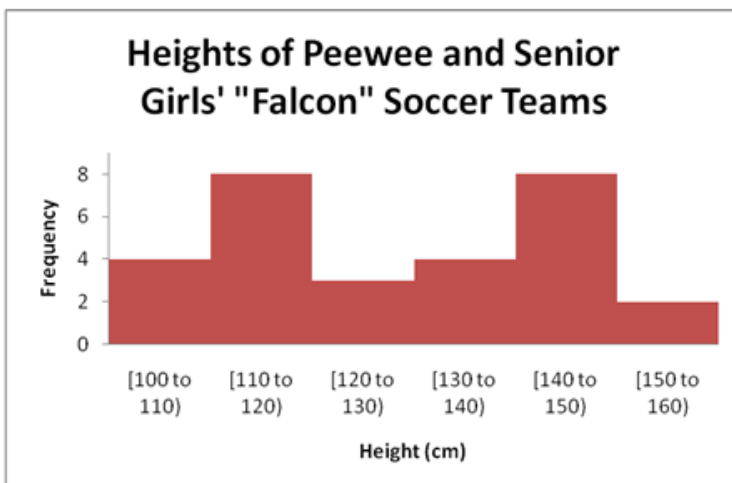
Also, all three measures of central tendency are exactly the same:

$$\text{mean} = \text{median} = \text{mode}$$

The normal distribution is important because it describes the statistical behavior of many real-world variables! Many variables can be modeled by a normal distribution

(**likely when the population is large enough**): scores on a test, masses of a potato chip bag, people’s heights in a specific age group for a certain gender, interest rates on investments, length of hairs on the human body...

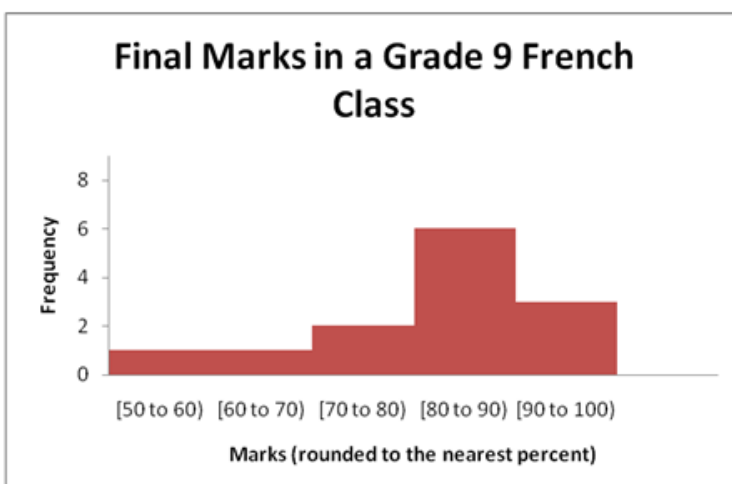
There are other types of frequency distributions:



A **bimodal distribution** contains two equally likely measures of central tendency. It has two “peaks” representing the two modes, and is symmetrical about these peaks.

Why is this distribution bimodal?

Heights 110 to 120 AND 140 to 150 are equally likely. They both have a mode of 8.



A **skewed distribution** is an asymmetrical distribution of data. It has a greater cluster of data on the right side than on the left, or vice-versa.

Why could this distribution be skewed?

There are many more high marks than low marks.



Entertainment: pp. 153-155 #1 to 4, and 6 to 8.

You need **graph paper** for #7! (This may take about 50 minutes.)