Chapter 2.1

Frequency Histograms

&

Distributions

Learning Objectives

At the end of this lecture, the student should be able to:

- State the steps for drawing a frequency histogram.
- Name two types of distributions and explain how they look.
- Define what an outlier is.
- Say one reason why you would make a frequency histogram.
- Define relative frequency and cumulative frequency.

Introduction

- Review of frequency histograms and relative frequency histograms
- Description of five common distributions in statistics
- Explanation of outliers

Photo by BlairSmith66

What is a Frequency Histogram?

Charting the Frequency Table

Frequency Histogram

- Explain what a frequency histogram is
- Describe the steps to drawing a frequency histogram
- Explain relative frequency histogram

Photo by Rego Korosi

What is a Frequency Histogram?

- It’s a specific type of bar chart made from data in a frequency table.
- Frequency histograms and relative frequency histograms.
- The purpose of the chart is to identify the “distribution” of the data.

Photo by Loqueveo

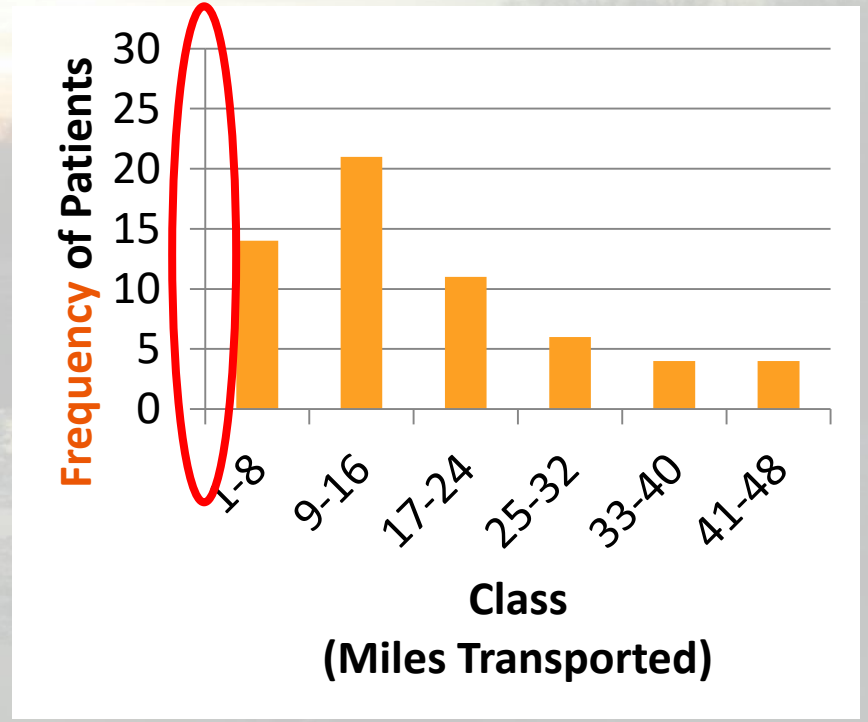
Steps to Follow to Draw a Frequency Histogram

1. Make a frequency table.

Class Limits	Freq-uency	Relative Freq-uency
1-8 miles	14	0.23
9-16 miles	21	0.35
17-24 miles	11	0.18
25-32 miles	6	0.10
33-40 miles	4	0.07
41-48 miles	4	0.07
Total	60	1.00

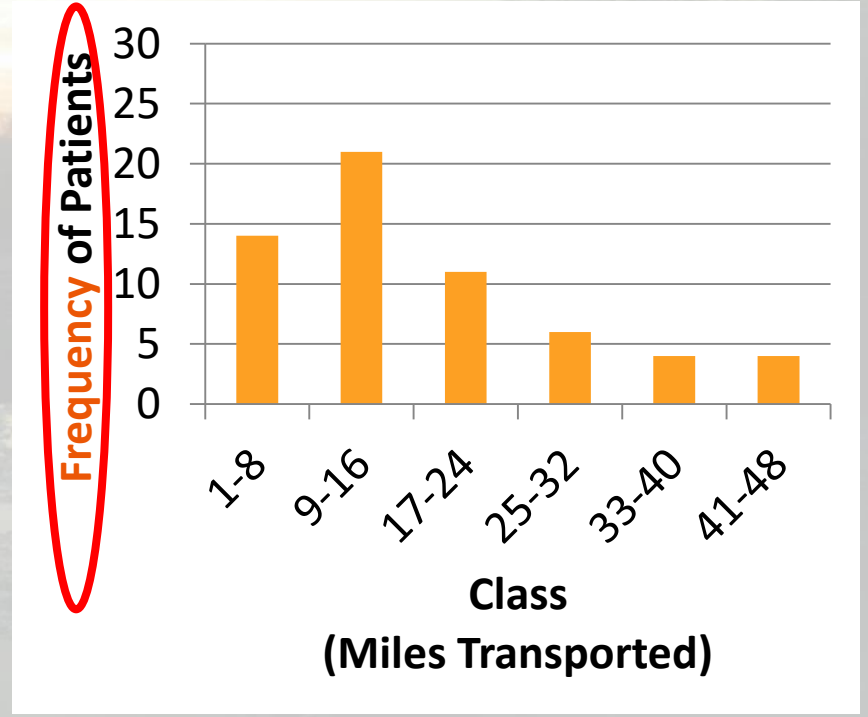
Steps to Follow to Draw a Frequency Histogram

1. Make a frequency table.
2. Draw a vertical line for the y-axis.



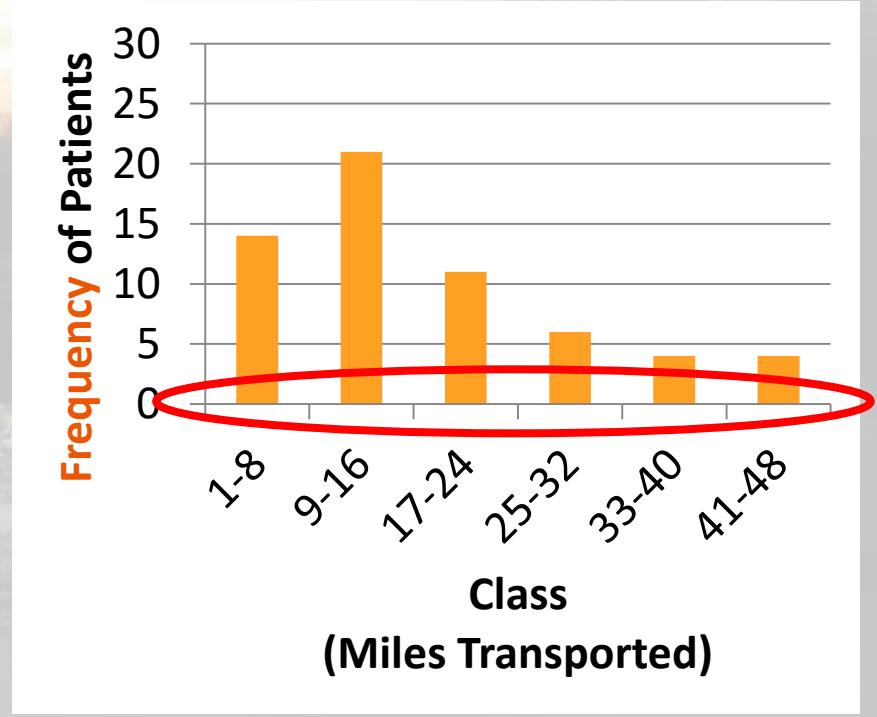
Steps to Follow to Draw a Frequency Histogram

1. Make a frequency table.
2. Draw a vertical line for the y-axis.
3. Write “Frequency of _____” along the y-axis.



Steps to Follow to Draw a Frequency Histogram

1. Make a frequency table.
2. Draw a vertical line for the y-axis.
3. Write “Frequency of _____” along the y-axis.
4. Draw a horizontal line for the x-axis.

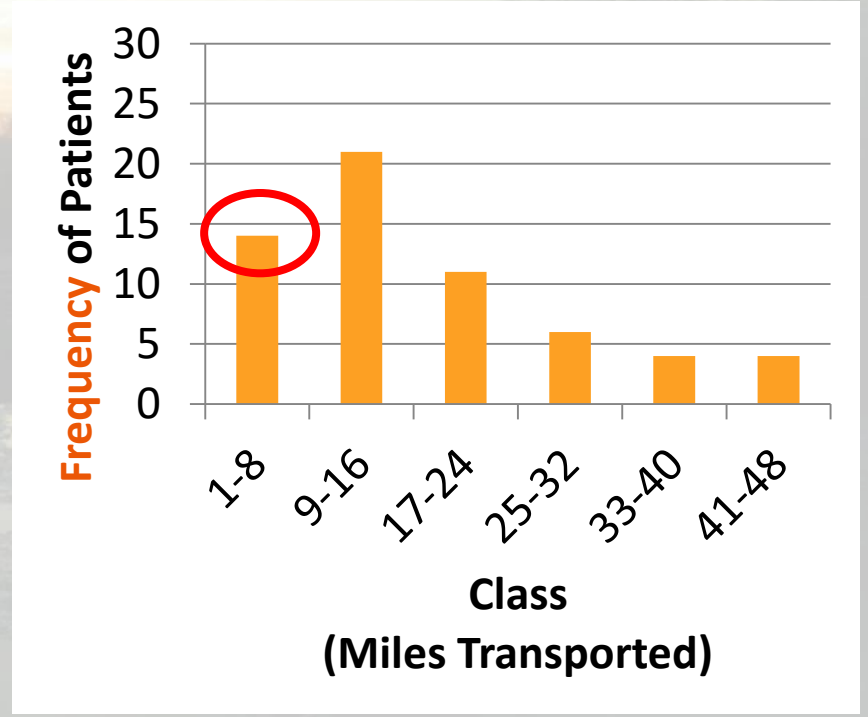


Steps to Follow to Draw a Frequency Histogram

1. Make a frequency table.
2. Draw a vertical line for the y-axis.
3. Write “Frequency of _____” along the y-axis.
4. Draw a horizontal line for the x-axis.
5. Write the classes below the x-axis and label them.

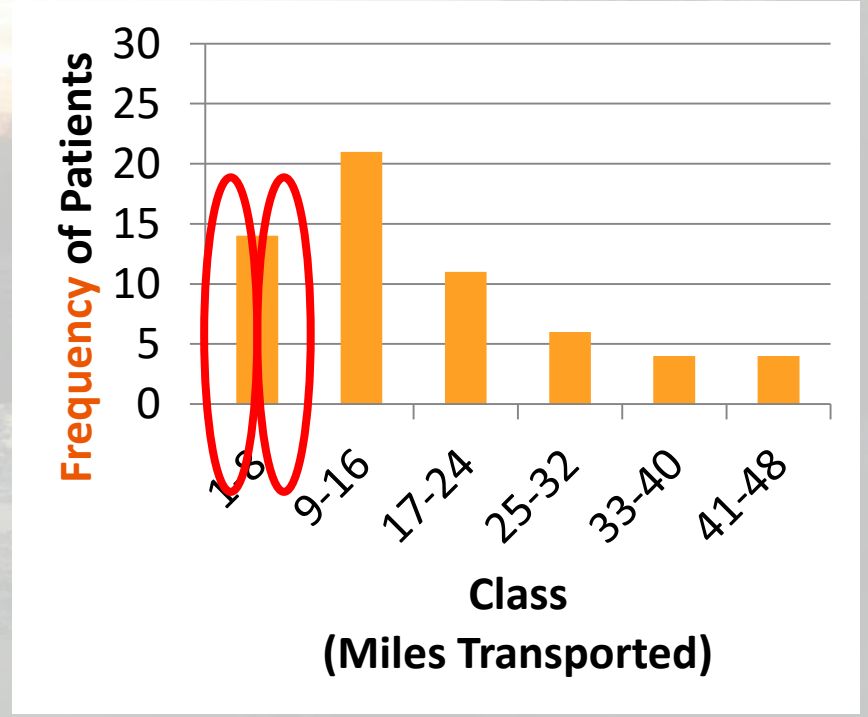
Steps to Follow to Draw a Frequency Histogram

6. For the first class, find the frequency in the table. Look for it on the y-axis and draw a horizontal line.



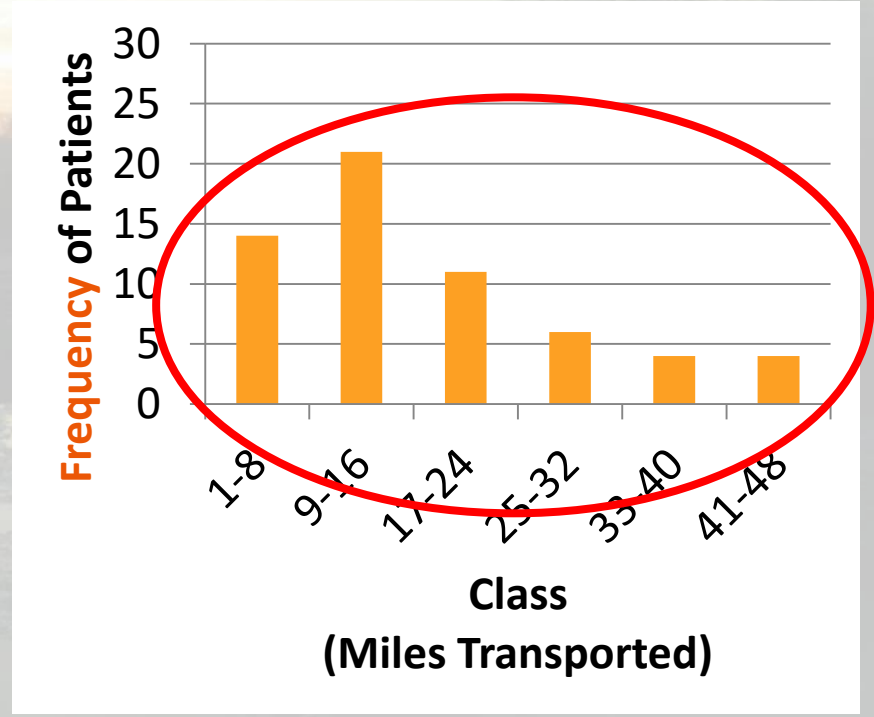
Steps to Follow to Draw a Frequency Histogram

6. For the first class, find the frequency in the table. Look for it on the y-axis and draw a horizontal line.
7. Draw two vertical lines down to make a bar.



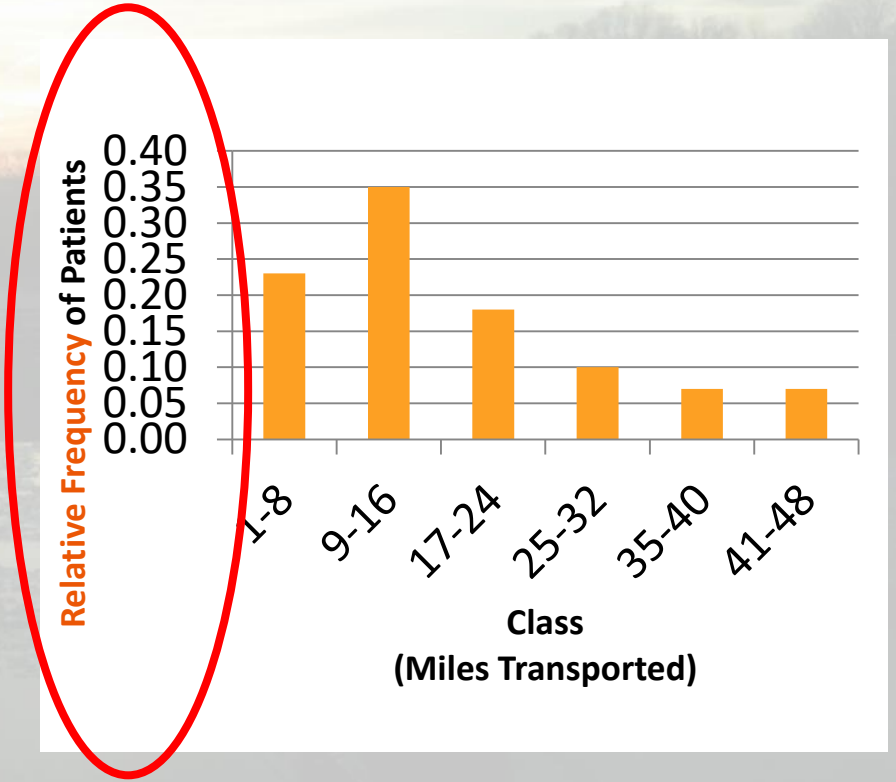
Steps to Follow to Draw a Frequency Histogram

6. For the first class, find the frequency in the table. Look for it on the y-axis and draw a horizontal line.
7. Draw two vertical lines down to make a bar.
8. Repeat for all the other classes.
9. Color in the bars



Relative Frequency Histogram

- In the relative frequency histogram, the relative frequency goes on the y-axis.
- The chart looks takes on a similar pattern.
- Relative frequency better for comparing two populations or two samples.



Frequency & Relative Frequency Histograms

Photo by Gabriel Miguel Gutierrez Valenzuela

- After making a frequency table, it is important to also make a frequency histogram and/or a relative frequency histogram.
- These are used to reveal the “distribution” in the data

Understanding Distributions

Frequency Histograms Reveal Distributions

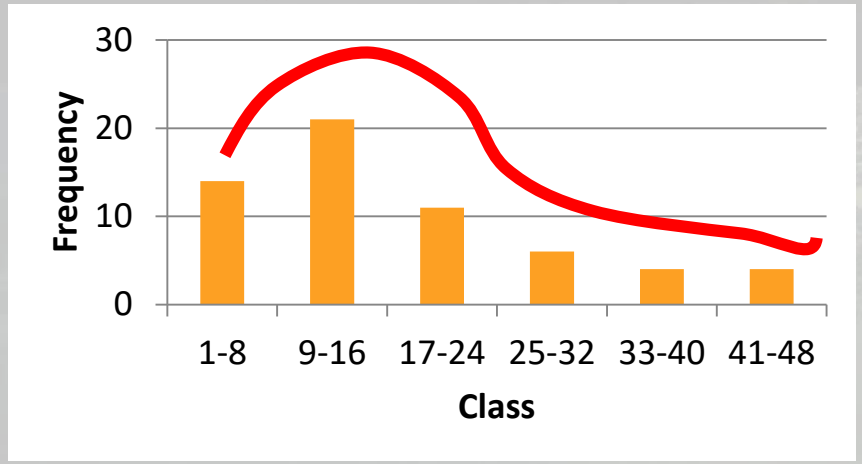
Distributions

- Define distribution and why it is important to know the distribution
- Describe outliers and how they can be found using histograms
- Example cumulative frequency and ogives

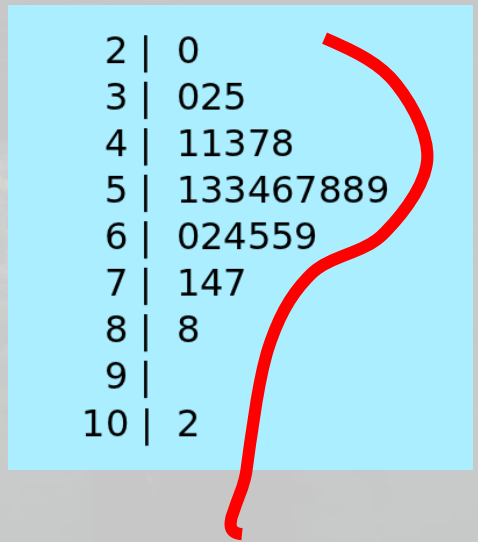
Photo by Keith Hall from UK

What is a Distribution?

- It is the shape that is made if you draw a line along the edges of a histogram's bars.



- A stem-and-leaf of the same data will make the same shape on its side.



5 Main Types of Distributions

1. Normal distribution (also called mound-shaped symmetrical)
2. Uniform distribution
3. Skewed left distribution
4. Skewed right distribution
5. Bimodal distribution

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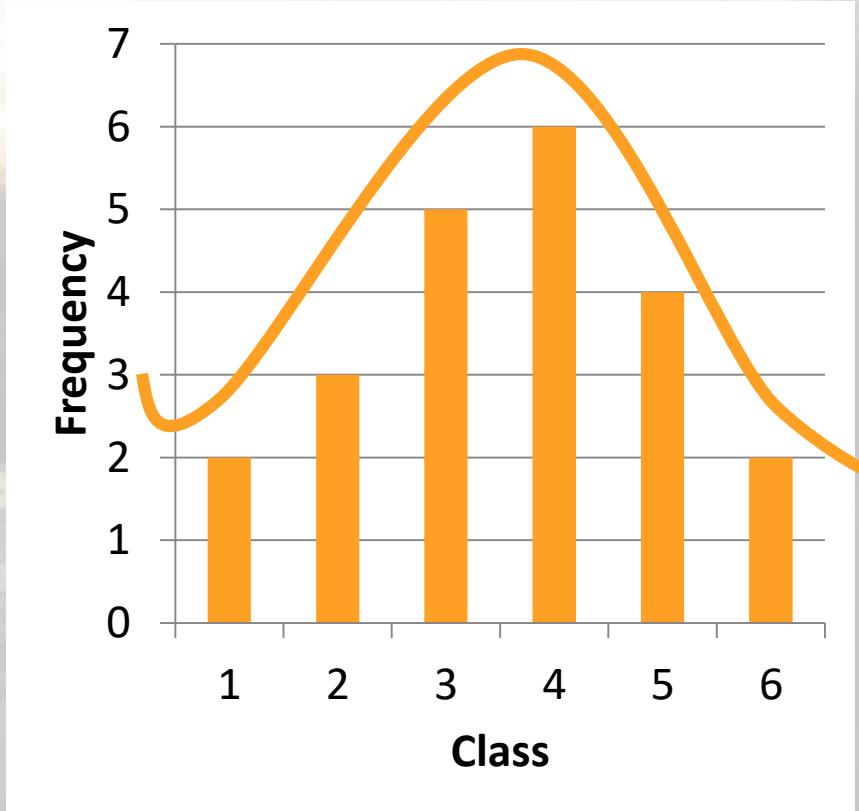

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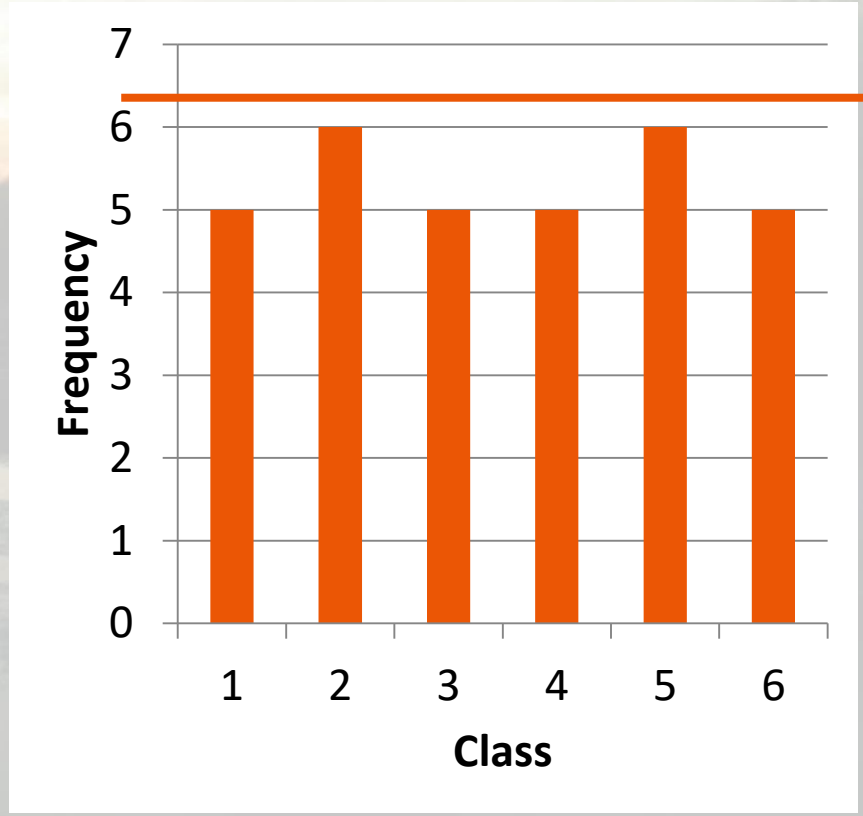

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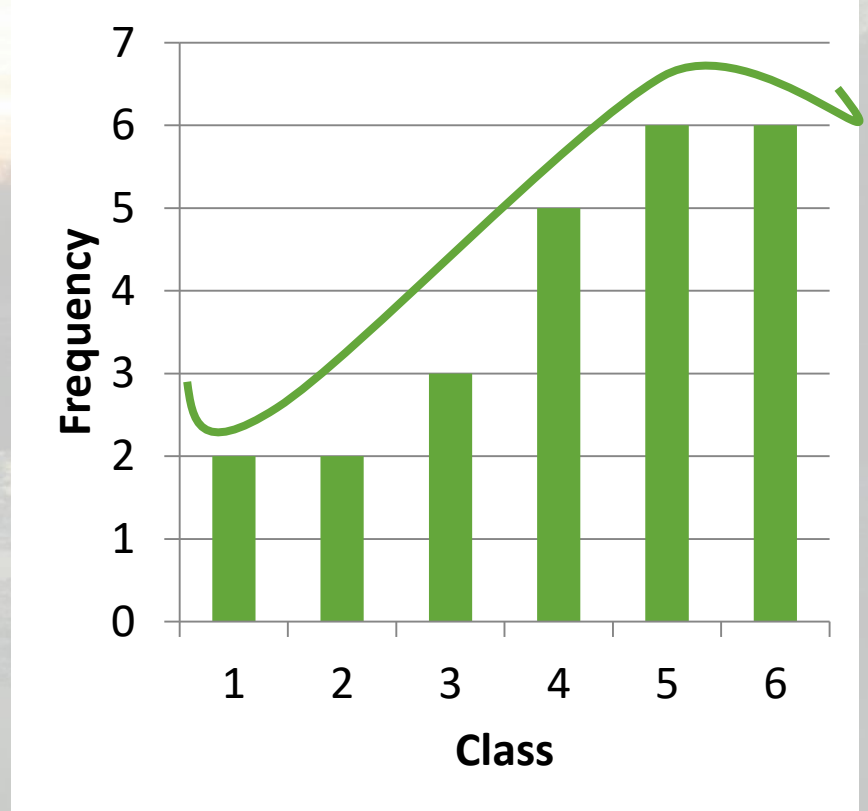

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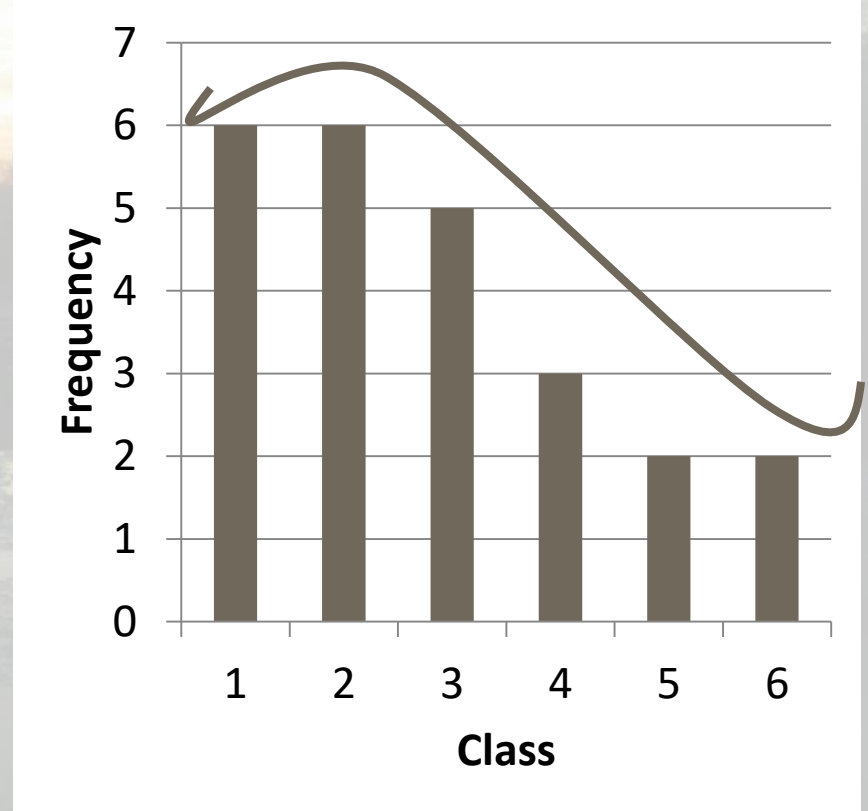

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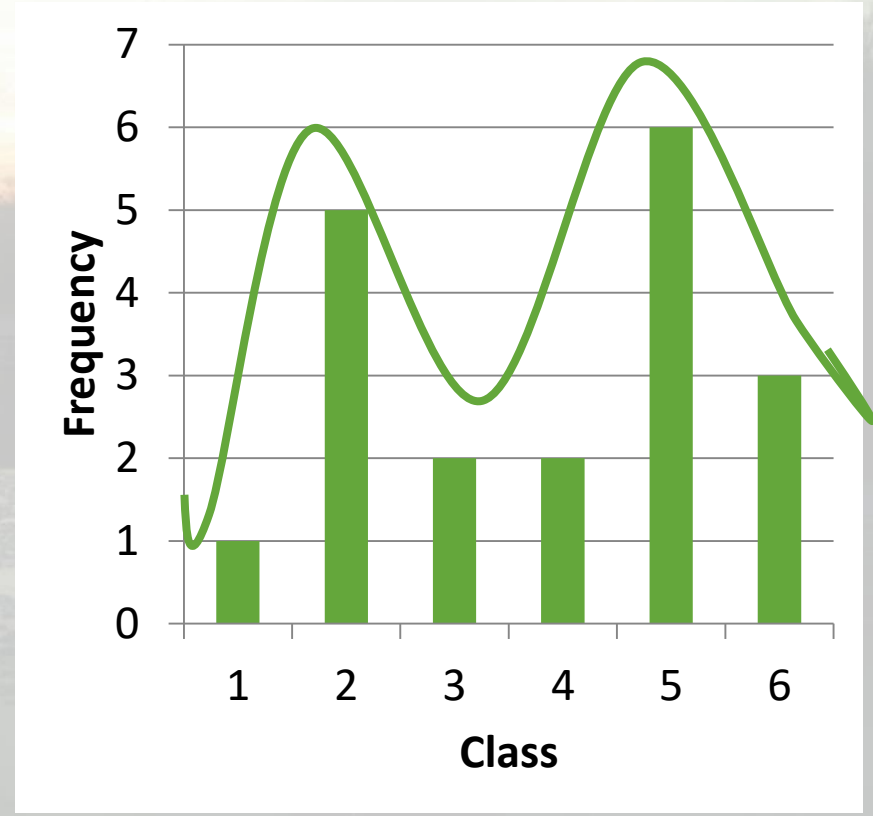
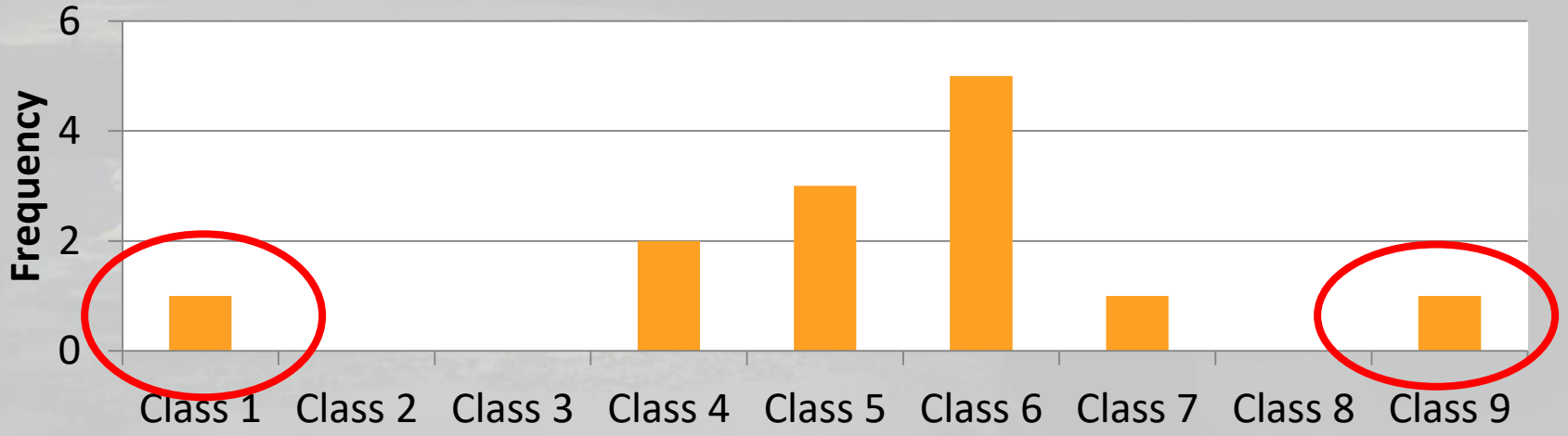


Outliers

Outliers are data values that are “very different” from other measurements in the dataset.



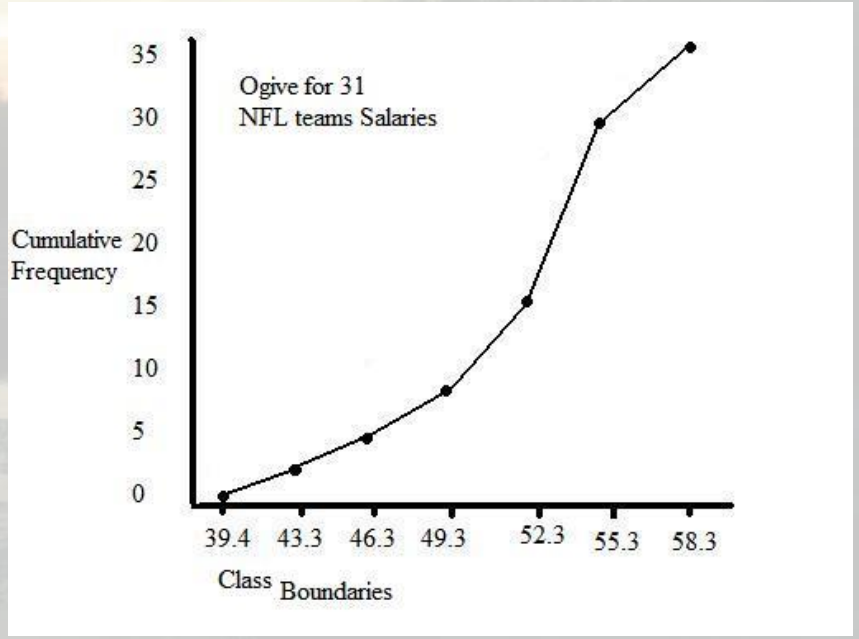
Cumulative Frequency

- In “cumulative frequency”, you add up all the classes before the class you are on.
- The first class is always the same as the frequency.
- Each cumulative frequency is equal to or higher than the last one.

Class Limits	Freq-uency	Cumulative Frequency
1-8 miles	14	14
9-16 miles	21	14+21=35
17-24 miles	11	35+11=46
25-32 miles	6	46+6=52
33-40 miles	4	52+4=56
41-48 miles	4	56+4=60
Total	60	60

Chart of Cumulative Frequency: Ogive

- Classes along the x axis, and cumulative frequency along the y-axis
- Because cumulative frequency goes up from class to class, the ogive line always goes up to the top frequency.



From JLW87/Wikimedia Commons

Distributions

Photo by Lariob

- There are 5 main types of distributions used in statistics.
- Histograms and stem-and-leaf displays are used to look for outliers.
- An ogive is a chart of cumulative frequency.

Conclusion

- The purpose of the histogram is to reveal the distribution
- Stem-and-leaf displays also reveal the distribution
- Knowing the distribution is important in statistics

Photo by Mark Dixon