Introduction to Statistics

Chapter 3: Displaying and Summarizing Quantitative Data

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Objectives:

## Students will be able to THINK about summarizing quantitative variables.

## Students will be able to make pictures of quantitative data to help us see the story data have to TELL.

## Students will be able to TELL what they see about the distribution by talking about shape, center, spread, and any unusual features.

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| **Main Idea** | **Notes** |
| **Dealing with a lot of Numbers** | When we look at large sets of quantitative data and summarize it, what do you think is the best thing to do?  We can’t use bar charts or pie charts for quantitative data. Those displays are for what kind of variables? |
| **Histograms**  **Histograms (Cont.)** | Making a Histogram:  Divide the range of *x*-values into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_called bins.  The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in each bin display the distribution of the variable.  This histogram shows the distribution of the magnitudes of earthquakes:  4  How does this display differ from a bar chart?  A histogram plots the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ within each bin as the heights of the bars (like a bar chart).  It displays the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at a glance.  This is what our variable (‘magnitude’) “looks like”:  4  A relative frequency histogram displays the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of cases  in each bin instead of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Here is a relative frequency histogram of earthquake magnitudes:  Figure4 |
| **Stem-and-Leaf Display**  **Constructing a Stem-and-Leaf Display** | This is an example of a stem-and-leaf display with split stems:  Key: 8/8 = 88 beats per minute  Compare the histogram and stem-and-leaf display for the pulse rates of 24 women at a health clinic.    Which graphical display do *you* prefer? Why?  Which would be easier to make by hand? Why?  How are the two graphs similar?  How are the two graphs different?  This is how you make a Stem-and Leaf display:  First, cut each data value into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (“stems”)  and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(“leaves”).  Use the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to label the bins.  Use only \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for each leaf - round the data values after the stem. |
| **Dotplots:** | A dotplot is a very simple display. Just place a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ along the axis for each data point.  This dotplot shows Kentucky Derby winning times, plotting each race as its own dot:  04-03a  Dotplots can be displayed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
| **Always THINK Before you Draw** | Remember the “Make a picture” rule?  *Think* carefully about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of display to make.  Before making a stem-and-leaf display, a histogram, or a dotplot, check the  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: The data are values of a quantitative variable whose units are known. |
| **Classwork:** | Creating different types of displays from “Siblings Data” |
| **Describing Distributions** | When asked to describe the *distribution* of a quantitative variable, you **must** discuss four things:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **“CUSS”** |
| **What is the Shape of the Distribution?**  **What is the Shape of the Distribution?**  **(Cont.)**  **What is the Shape of the Distribution?**  **(Cont.)** | When thinking about shape, ask yourself the following:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **HUMPS:**  Humps in a histogram are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Histograms with one main peak are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Histograms with two peaks are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Histograms with three or more peaks are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Histograms where the bars are around the same height is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  What is the shape of this distribution below? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  04-04a  What is the shape of this distribution below? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  04-05a  **SYMMETRY:**  If you can fold the histogram down the middle and have the edges match pretty closely,  the histogram is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  04-06a  The thinner ends of a distribution are called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  When a distribution is not symmetric, the distribution is skewed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  What direction is the skew for each of the graphs below?  04-07a  **ANYTHING UNUSUAL:**  Sometimes it’s the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that tell us something interesting about the data.  You should always mention any \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that stand away from the body of the distribution.  Are there any gaps in the distribution? If so, we might have data from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Examples: What is unusual about each of the histograms?  04-08a  04-03a |
| **Classwork:** | Chapter 3 Classwork: Thinking about Shape |
| **Where is the Center?**  **Example: Finding the Median** | It’s easy to find the center when a distribution is uni-modal and symmetric - it’s right in  the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Figure4  It’s not so easy to find the center of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or a  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ distribution.  04-04a  The first type of center is the **MEDIAN.**  The median is the value with exactly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the data values below it and half above it.  Picture 10  ***Note: We will talk about the mean (the other measure of center) in a bit!***  What is the median of each set of data?  {3, 6, 2, 8, 9, 7}  {5, 8, 5, 2, 3, 4, 5}  {10, 2, 3, 5, 9, 11, 16} |
| **What is the Spread?**  **What are Quartiles?** | Statistics is about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Are the values of the distribution tightly clustered around the center or spread out?  Always report a measure of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ along with a measure of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when describing a distribution.  The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the difference between the maximum and minimum values:  Range = max – min  What is a disadvantage of using the range?  The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (IQR) lets us ignore extreme data values and concentrate on the middle of the data.  The difference between the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is called the inter-quartile range (IQR).  IQR = upper quartile – lower quartile  Quartiles divide the data into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ equal sections.  One quarter of the data lies \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the lower quartile, Q1.  One quarter of the data lies \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the upper quartile, Q3.  The quartiles border the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ half of the data. |
| **Examples: Finding the Range, Median Quartiles, and Interquartile Range**  **Spread** | Find the range, median, quartiles, and IQR for each data set.  {3, 6, 9, 10, 14, 17}  Range = \_\_\_\_\_\_\_\_\_\_\_\_\_\_  Median = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Q1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Q3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  IQR = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  {2, 8, 11, 16, 25, 54, 76}  Range = \_\_\_\_\_\_\_\_\_\_\_\_\_\_  Median = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Q1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Q3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  IQR = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  {9, 2, 16, 54, 33, 22, 7}  Range = \_\_\_\_\_\_\_\_\_\_\_\_\_\_  Median = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Q1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Q3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  IQR = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  The lower and upper quartiles are the \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_percentiles of the data, so…  The IQR contains the middle \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the values of the distribution, as shown:  Picture 11 |
| **5-Number Summary** | A distribution’s 5-number summary reports its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  The 5-number summary for tsunami earthquake *Magnitudes* looks like this:  Picture 12 |
| **Example: 5-Number Summary** | Report the 5-Number Summary for the following data set:  {6, 9, 24, 35, 46, 57, 68} |
| **What about the Mean?** | The mean is the other measure of center. It is also known as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Here is the formula for finding the mean:    New symbol 🡪 μ (mu) = mean of a population  What is the mean of this data set? {2, 3, 4, 5, 6}  μ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  The mean “feels” like the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because it’s the point where a histogram balances!  Figure4 |
| **Examples: Finding the Mean** | Find the mean of each of the following:  {1, 2, 5, 7, 9, 10, 11, 12}  {34, 56, 76, 45, 24, 32, 12} |
| **Mean or Median?** | If the data is skewed, would you use the mean or median as a measure for the center?  Why?  To choose between the mean and median, start by looking at the data.  If the histogram is symmetric and there are no outliers, use the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.    If the histogram is skewed or with outliers, use the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
| **Handout:** | How Shape Changes Measures of Center |
| **Classwork:** | Measuring Shape and Center Worksheet |
| **Classwork:** | Creating Boxplots Worksheet |
| **Fish Tank Method** | Matching Histograms to Boxplots  (Take notes on the “Fish Tank Method” below) |
| **Fish Tank Method (Cont.)** |  |
| **Classwork:** | Matching Boxplots to Histograms Activity:  Cut out each of the graphs. On a separate piece of paper, glue all the matches together and write a brief explanation as to why you matched up those graphs. You can draw fish tanks if it helps you. |
| **Standard Deviation** | A more powerful measure of spread than the IQR is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which takes into account how far ***each*** data point is from the mean.  ***“Standard Deviation is the average***  ***distance to the mean.”***  Like mean, standard deviation gets pulled by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  When describing a unimodal/symmetric distribution, use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_for  center and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for spread, otherwise use  the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for center and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for spread. |
| **How do we find Standard Deviation?**  **How do we find Standard Deviation? (Cont.)**  **How do we find Standard Deviation? (Cont.)** | Now we will figure out how to find the standard deviation…  First, look at the data set {2, 3, 4, 5, 6}. What is the mean?  What is the formula that we just used?  Now find the average distance to the mean.  What is the formula we just used?  This is called the **mean standard deviation.**  What if we get rid of the absolute value bars? What else could we do so the numbers won’t cancel each other out?  Now let’s square all the distances from the mean and find the average.  What do you get?  This is called the **variance.** The symbol for variance is σ².  So how can we get just the **average distance to the mean?**  Write the formula for Variance:  Write the formula for Standard Deviation:  This is the closest estimate for the **average distance to the mean.**  What about finding the mean, variance and standard deviation of a sample?  The equations are a little different and we use different symbols.  **🡪 mean**  **Variance 🡪**  **Standard Deviation 🡪** |
| **Example: Finding the Mean, Variance, and Standard Deviation** | Let’s say we check the amount of money in 10 students’ pockets.  {0, 0, 0, 1, 1, 1, 1, 3, 3.25, 3.25}  What is the mean, variance, and standard deviation? |
| **Classwork:** | Variance and Standard Deviation Exercise |
| **Thinking About Variation:** | Statistics is about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so spread is an important fundamental concept.  Measures of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_help us talk about what we *don’t* know … think of the spread as the “error” in our data - stuff we can’t explain.  Data with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are not BAD…just notable; the “stuff” we need to be aware of and talk about when we analyze data. |
| **Center, Unusual Features, Shape, and Spread - Summarized** | **Center:**  Is the distribution unimodal and (roughly) symmetric? If so, describe the distribution’s  center using \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If not, use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  **Unusual Features:**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  If there are multiple \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, try to understand why. If you identify a reason for  the separate modes, it might be a good idea to split the data into two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  If there are clear outliers and you want to report mean and standard deviation, report  them with the outliers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and with the outliers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  The differences may be quite revealing.  **Shape:**  Uniform or not?  If not…  How many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (unimodal, bimodal, multi-modal)  Symmetric or not?  If not…  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (in the direction of the tail)  **Spread:**  If you use mean to describe the center, use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to describe the spread.  MEAN 🡪 STANDARD DEVIATION  If you use the median to describe the center, use the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to describe the spread.  MEDIAN 🡪 IQR |
| **Example: Which is Higher (Mean or Median)?** | Which is Higher, Mean or Median?  For unimodal and symmetric data.  For skewed data and data with outliers. |
| **Example: Resistant or Not?** | Circle the descriptions for a set of data that are resistant to skewness and outliers. |
| **Example: CUSS for me!** | Describe the distribution of the following:     |  |  | | --- | --- | | **Mean** | **Std. dev.** | | 65.02439 | 3.4076224 | |
| **Classwork:** | Activity: Matching Statistics and Graphs  (Explain how you made your choices on a separate piece of paper for Activity 1 and 2) |
| **Classwork:** | Using 1-Var Stats on the Calculator |
| **Classwork:** | 1. Creating Ogives  2. Matching Ogives to Histograms - Rectangle Drop Method  (Take notes on the paper given) |
| **Classwork/**  **Homework:** | Chapter 3 Review for Test |