

## Statistics

### Quiz 1 – Descriptive Statistics

- 1.) Which of the following measures of central tendency takes into account **all** of the data in a set of numbers? **MEAN / MEDIAN / MODE**
- 2.) Which measure of central tendency requires that the numbers in a data set be arranged in order before you find or calculate it? **MEAN / MEDIAN / MODE**
- 3.) Which measure of central tendency tends to tune-out data value(s) that are extremely larger or extremely smaller than the majority of the numbers in a data set? **MEAN / MEDIAN / MODE**
- 4.) Shown below is the mileage recorded by the school van for 8 different trips.

12.5 mpg	16.75 mpg	11.0 mpg	12.5 mpg
12.25 mpg	11.75 mpg	12.5 mpg	13.0 mpg

For this group of data compute the

- a.) *mean* \_\_\_\_\_
  - b.) *median* \_\_\_\_\_
  - c.) *mode* \_\_\_\_\_
  - d.) *range* \_\_\_\_\_
  - e.) *standard deviation* \_\_\_\_\_
- 5.) Shown below are 9 quiz scores for a Physics student.

93%	95	90	93	70
92	94	96	68	-----

- a.) Calculate the MEAN quiz score for this student. \_\_\_\_\_
- b.) Calculate the MEDIAN quiz score for this student. \_\_\_\_\_
- c.) If the two low scores are a result of being sick and missing class, which measure of central tendency do you think is more “fair” to the student? **MEAN / MEDIAN**
- d.) If you believe that being sick is "just too bad" and there are no excuses for low quiz scores, which measure of central tendency would you use? **MEAN / MEDIAN**

## Statistics

### Quiz 1 – Descriptive Statistics

6.) **TRUE / FALSE** If the **range** of a data set is relatively large, that means that the numbers in the data set are very similar in size.

7.) Compute the *range* and *standard deviation* for this set of numbers.

Hourly salaries at Acme Technology:

\$10.28      \$9.18      \$8.05      \$10.50      \$11.85      \$8.03

*range* = \_\_\_\_\_

*standard deviation* = \_\_\_\_\_

8.) Which machine does a better job at accurately filling 12 oz-size cereal boxes? Answer the question below in order to find out.

### G-Tech

Results of filling 15 boxes selected at random from a 1000 box production run.

12.0oz	11.5	11.0	12.9	11.0
12.1	12.9	10.9	11.2	11.3
12.9	13.2	10.8	11.2	12.0

### Dynamic Flow

Results of filling 15 boxes selected at random from a 1000 box production run.

12.2	12.5	11.8	11.5	12.1
11.6	11.7	12.2	12.5	12.2
12.6	12.5	11.9	11.8	11.5

Determine the *mean* number of ounces per box for each machine:

G-Tech: \_\_\_\_\_ oz

Dynamic Flow: \_\_\_\_\_ oz

Determine the *range* in terms of ounces for each machine:

G-Tech: \_\_\_\_\_ oz

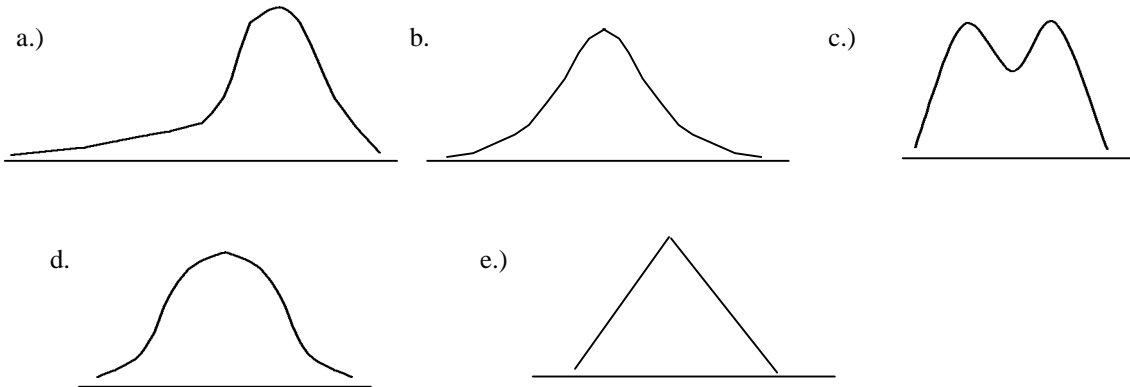
Dynamic Flow: \_\_\_\_\_ oz

Which machine did a better job at consistently filling the boxes to the desired 12 oz amount?

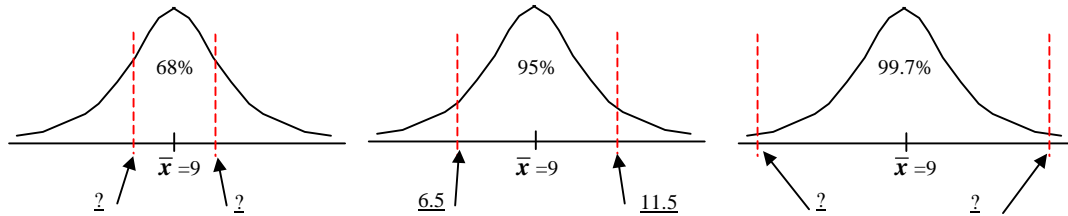
## Statistics

### Quiz 2 – Normal Curves

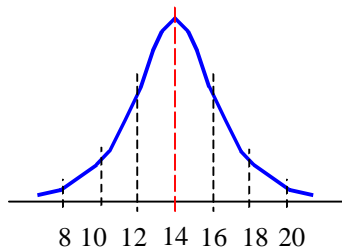
1.) Which of the following distributions are not normal distributions? Circle all that apply.



2.) A group of data that is normally distributed has a mean of 9 and a standard deviation of 1.25. Label the upper and lower boundary values where you would expect to find 68% of the data, 95% of the data, and 99.7% of the data. The 95% interval has been done for you.



3.) Determine the **mean** and **standard deviation** for the following normal distribution:



$$\bar{x} = \underline{\hspace{2cm}}$$

$$s = \underline{\hspace{2cm}}$$

4.) Refer to the distribution in Problem 3 to answer the following questions:

a) 68% of the data in the distribution, is found between the lower boundary of \_\_\_\_\_ and the upper boundary of \_\_\_\_\_.

b) 95% of the data in the distribution, is found between the lower boundary of \_\_\_\_\_ and the upper boundary of \_\_\_\_\_.

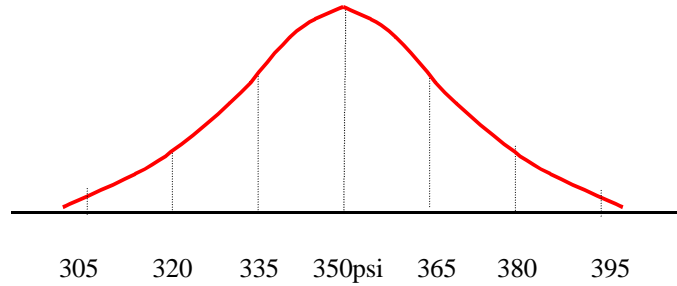
c) 99.7% of the data in the distribution, is found between the lower boundary of \_\_\_\_\_ and the upper boundary of \_\_\_\_\_.

5.) Make a quick sketch of a normal distribution with a *small standard deviation*. On the same drawing make a normal distribution with a *large standard deviation*.

**Statistics**  
Quiz 2 – Normal Curves

6.) Refer to the diagram below to answer the following questions:

Results from Pressure Test  
on Corrugated Cardboard  
*150 samples tested*



The numbers shown on this scale refer to resistance-to-puncture strength of the cardboard.

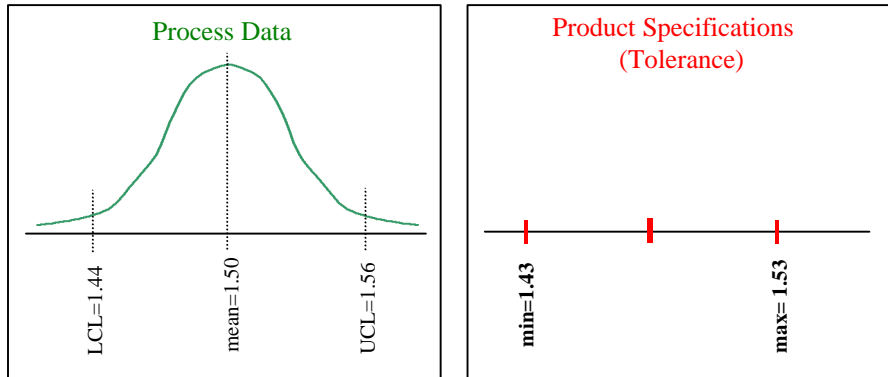
- a.) The product tested in this example is \_\_\_\_\_.
- b.) How many samples were tested? \_\_\_\_\_
- c.) The *mean* resistance-to-puncture strength is \_\_\_\_\_ psi (*pounds per square inch*)
- d.) The *standard deviation* for this set of data is \_\_\_\_\_ psi. (*nearest tenth*)
- e.) 68% of the sample pieces tested had puncture strengths between \_\_\_\_\_ psi and \_\_\_\_\_ psi. This represents \_\_\_\_\_ pieces of cardboard.
- f.) *What percent* of all the tested samples had puncture strengths greater than 380 psi?



## Statistics

### Quiz 3 – SPC and Correlation

6.) The graphic on the left shows process data (with *mean*, *LCL*, and *UCL*) resulting from manufacturing a steel rod. The graphic on the right shows the designers product specifications for the steel rod.

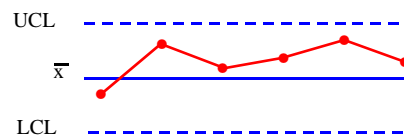


When you compare the Process Data against the Product Specifications, what observation seems to be the most accurate:

- The process appears to be making products close to the required product specifications. The process mean is close to the ideal product specification. The control limits are within the bounds of the maximum and minimum tolerance so few of the steel rods made will be defective.
- The process appears to be operating slightly to the left when compared to the product specifications. While some products made will be larger than the maximum allowable product specification, many more will be made smaller than the minimum allowable product size.
- The process appears to operating slightly to the right when compared to the product specifications. There is a greater chance of making products larger than the maximum allowable product specification, and a somewhat smaller chance that products will be made smaller than the minimum allowable product size.

7.) Given the plotted data of this production run, which interpretation seems most appropriate?

- There is a steady trend of points heading toward one of the control limits.*
- There are five or more consecutive points on one side of the centerline.*
- Several points lie near a control limit.*
- Process appears to be operating normally.*



# Statistics

## Quiz 3 – SPC and Correlation

8.) a) Determine the **sum**, **average**, and **range** for each hour, then *plot the data* points for both the  $\bar{x}$  chart and the  $R$  chart. Then draw lines to connect the data points within each chart.

b.) Circle any points that exceed the control limits.

Department: 45A    Process: Cereal Box Filling (24 oz boxes)									
$\bar{x}$ chart	UCL 24.4								
	$\bar{x}$ 24.0								
	LCL 23.6								
$R$ chart	UCL 0.5								
	$\bar{R}$ 0.1								

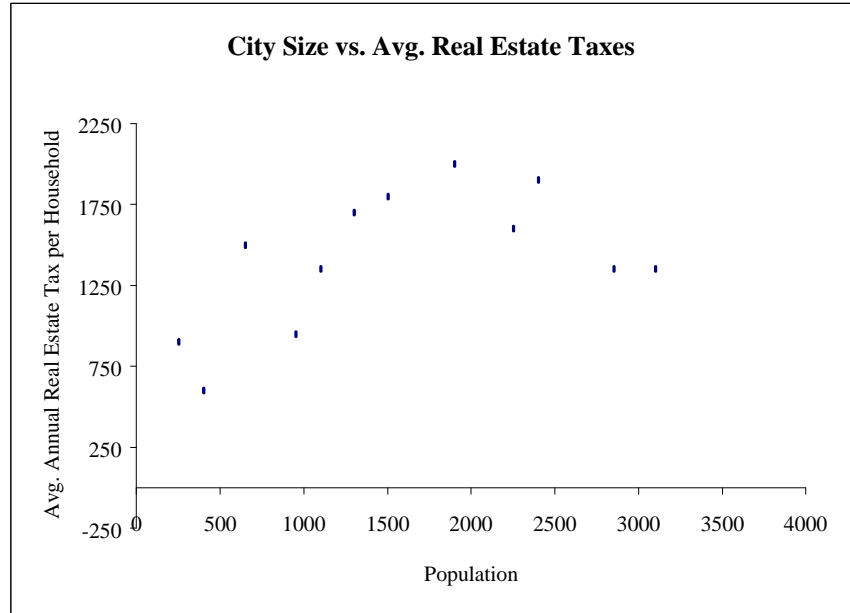
Date		4-11-2004								
Time		7:00	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00
Measurement	1	23.9	24.3	24	24.3	24.3	24.4			
	2	23.8	24.1	23.9	24.2	24.5	24.3			
	3	24	24	23.8	24	24.5	24.5			
	4	23.9	24.2	23.6	23.8	24.6	24.4			
	5	23.8	24.1	23.7	24.2	24.4	24.3			
Sum										
Avg, $\bar{x}$										
Range, $R$										

## Statistics

### Quiz 3 – SPC and Correlation

9.) Does there appear to be a correlation between the population size of a city and the average real estate tax paid by each household? Use the correlation procedure outlined in your textbook to decide. Fill-in the blanks below to help determine the answer.

Population	Avg. Real Estate Taxes Paid
250	900
400	600
650	1500
950	950
1100	1350
1300	1700
1500	1800
1900	2000
2250	1600
2400	1900
2850	1350
3100	1350



a) On the scatter plot (shown above right) use a ruler or straightedge to draw lines to show the four quadrants.

b) Quadrant I: \_\_\_\_\_ points  
Quadrant II: \_\_\_\_\_ points  
Quadrant III: \_\_\_\_\_ points  
Quadrant IV: \_\_\_\_\_ points

c) Sum of Quadrants I and III: \_\_\_\_\_  
Sum of Quadrants II and IV: \_\_\_\_\_

d) Based on the above results, there appears to be:

- a) a positive correlation
- b) a negative correlation
- c) no correlation