

\* Cover Sheet w/ lab Name & Names of all members.

\* Individual lab for each team member.  
 \* All answers on a separate sheet clearly organized.

Lab Report : If tl. Love Fits

Teacher Name: Ms. Heiligenberg

APUCSIL INQUIRY

CATEGORY	5	3	1	0	Score
Participation Part 1	All student measurements present.	One team member missing	Two members missing.	No data.	
Statistics Part 1	All data filled in.	100% < calculations < 50%	<50% calculations	No Calculations	
Part 2 Table	Table completely filled in with reasonable values.	Table completely filled in but one or two values do not make sense.	Table not completely filled in or more than two values do not make sense.	Table blank.	
Part 2 - Questions	Completely and accurately answered.	All but one completely and accurately answered.	More than one not answered or inaccurately answered.	This item is missing.	
Part 3 Table	Table completely filled in with reasonable values.	Table completely filled in but one or two values do not make sense.	Table not completely filled in or more than two values do not make sense.	Table blank.	
Part 3 - Questions	Completely and accurately answered.	All but one completely and accurately answered.	More than one not answered or inaccurately answered.	This item is missing.	
Part 4 - Summary	Part 4 fully addressed.	Part 4 more than 50% but not fully addressed.	Some response but less than 50% complete.	No summary is written.	

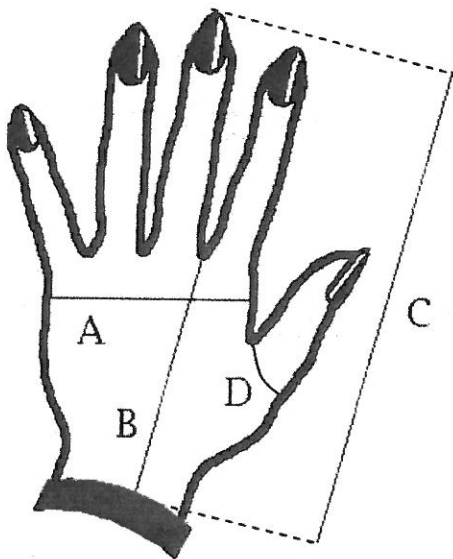
Activity Goals:

In this activity the students will take measurements of their hands and summarize the data in an appropriate form to recommend measurements for sizes of gloves to be produced by a new company.

The topics that are the basis of this activity are:

- I. Collecting Data and Calculating Data Statistics
- II. Setting up and interpreting box plots in order to get glove sizes
- III. Using the Empirical rule to get glove sizes

1. For every person in your group record the following measurements for the left hand on the Lab Report Data Sheet: (record all measurements to the nearest tenth of a centimeter)



A = the distance from the outside to the inside of the hand, measured just below the knuckles

B = the distance from the base of the index finger to the wrist; (place the hand on a table and measure on top of the hand from the bend in the wrist)

C = the distance from the tip of the middle finger nail to the wrist

D = the distance around the base of the thumb

2. Your instructor will assign your group a gender for which you will find the five number summary, the mean, and standard deviation for each measurement.

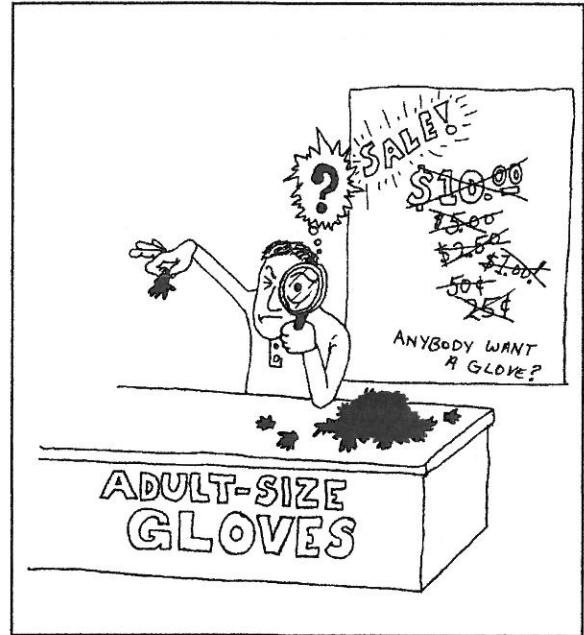
For the lab report, answer all questions using complete sentences. Neatly show all work and any formulas used. Use ~~Excel~~ to assist with determining the descriptive statistics for each dimension, although show your mathematical steps for determining the first and third quartiles.

*calculator*



## PART II – BOX PLOT APPROACH

- In your report to the glove manufacturer, summarize your data in a similar (box plot) form. You need to make 4 box plots, one each for measurements A, B, C, and D for whichever gender you were assigned.
- Discuss with your group what percentage of the glove company's production should be devoted to each of the sizes if the **decision is based on the box plot summaries**. You may assume the entire population has the same five-number summary as the sample data on the previous page.



For each dimension (A-D) decide which descriptive statistic will determine each size and dimension for the gloves to fit all the individuals you want that size glove to fit and indicate this ONE measurement in each category in the table below. These are the dimensions to which the glove manufacturer will actually cut the gloves.

Indicate whether the data are for men or women. \_\_\_\_\_

	Small	Med. 1	Med. 2	Large
(A) Outside to Inside				
(B) Base of Finger to Wrist				
(C) Tip of Finger Nail to Wrist				
(D) Base of Thumb's Circumference				

5. What percentage of the glove company's productions should be devoted to each of the sizes if the decision is based on the box plot summaries?

6. Briefly explain to your associate at the glove company why you recommend these measurements and explain the statistical basis for your recommendations.

7. If your box plots contained any outliers, how might a glove company deal with such values?

## PART III – EMPIRICAL RULE APPROACH

The glove company also wants an analysis of the data based on the **Empirical Rule**, if appropriate, and recommendations for three sizes: small, medium, and large for gloves for men or women.

8. Use the Empirical Rule on the hand measurement data for measurement C (tip of finger nail to wrist) for your group's gender as a check to see if the hand measurement data have bell shaped distributions. (Note: Just check for this one measurements only, and assume the other hand dimensions would produce consistent results.)

This will require you to compute appropriate intervals of numbers for this dimensions, and then ACTUALLY COUNT the number of data values within these intervals. Compare the percentages IN YOUR DATA sets to the statistically accepted percents for the Empirical Rule.

Do they compare enough to assume hand measurements have a bell-shaped distributions? Use your percent comparisons to explain. Show your work and write your conclusion for this question on a separate page and attach it to this report.

9. Even if you have reported that the Empirical Rule does not apply, the glove company feels that your sample may have been too small for a reliable check for bell shaped distributions, and **they want glove size dimensions based on the Empirical Rule anyway.**

Complete the table below with ONE measurement in each category that would be indicated if hand measurements have bell shaped distributions. These are the dimensions to which the glove manufacturer will actually cut the gloves.

Indicate whether the data are for men or women. \_\_\_\_\_

	Small	Medium	Large
(A) Outside to Inside			
(B) Base of Finger to Wrist			
(C) Tip of Finger Nail to Wrist			
(D) Base of Thumb's Circumference			

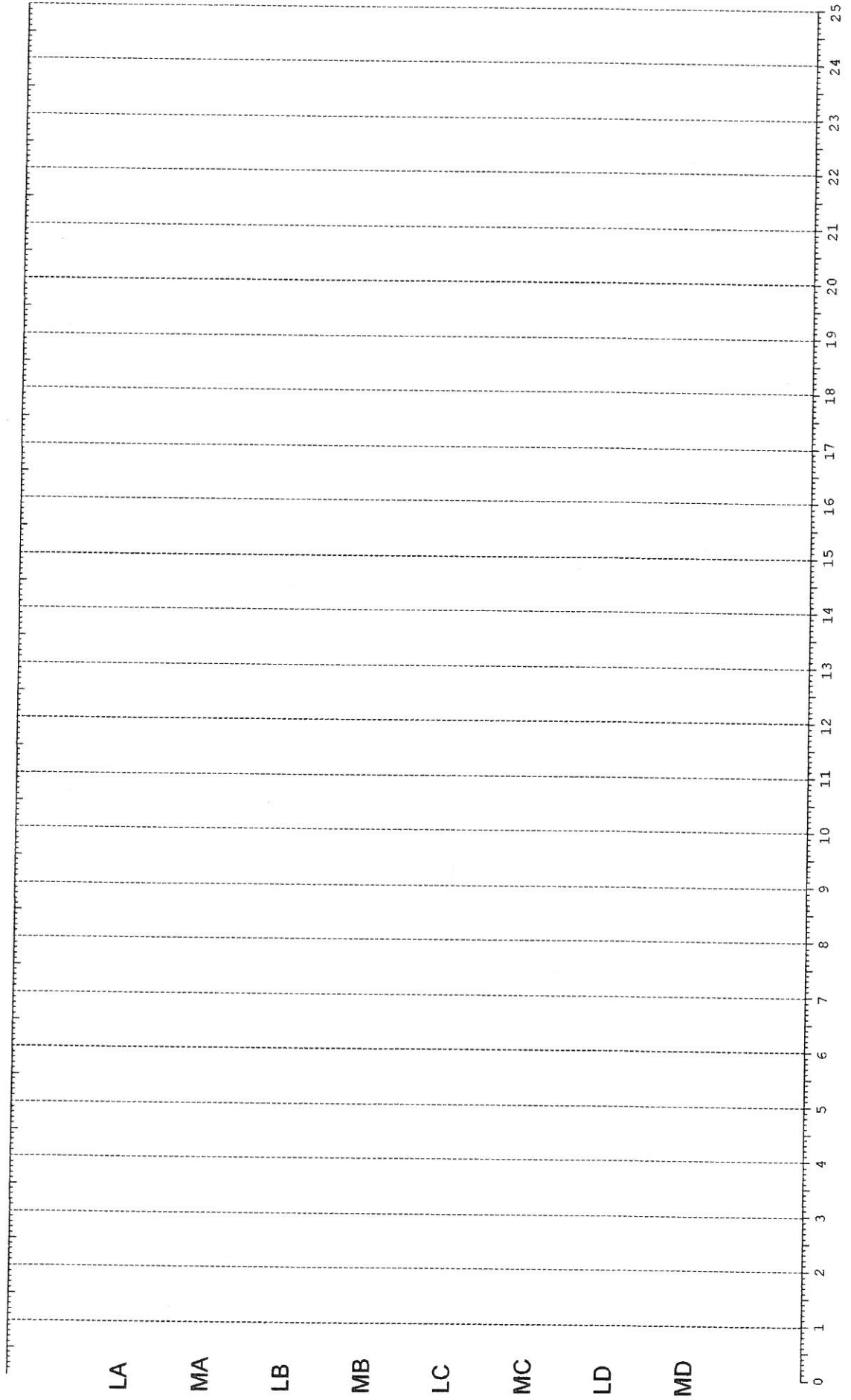
10. What percentage of the glove company's production should be devoted to each of the sizes if the decision is based on the Empirical Rule? Explain **why** you chose those percentages.

## **PART IV – SUMMARY**

11. Summarize this activity and what you have learned. Why would using statistics be important in determining glove size dimensions?

12. In doing this activity, what did you find to be the most interesting? Be specific.

# LAB 3 – Box Plot Sheet



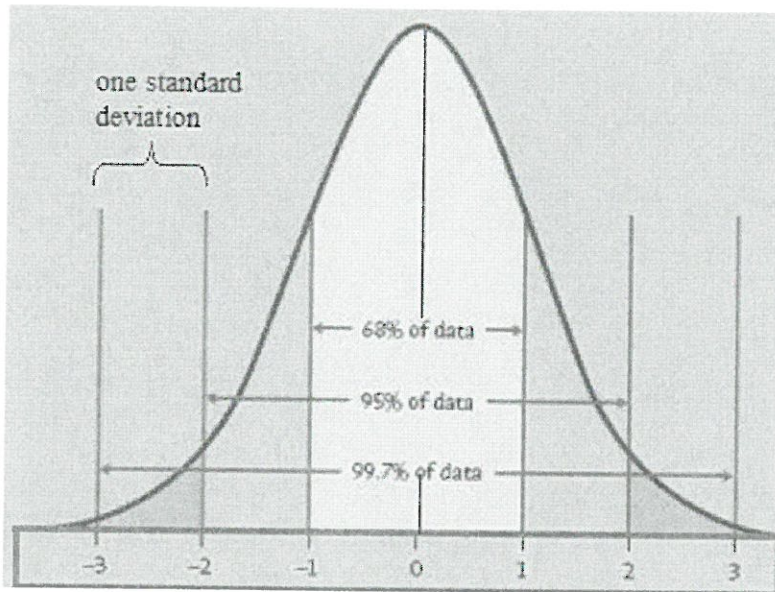


# Definition of the Empirical Rule

The empirical rule states that for a normal distribution, nearly all of the data will fall within three standard deviations of the mean. The empirical rule can be broken down into three parts:

- 68% of data falls within the first standard deviation from the mean.
- 95% fall within two standard deviations.
- 99.7% fall within three standard deviations.

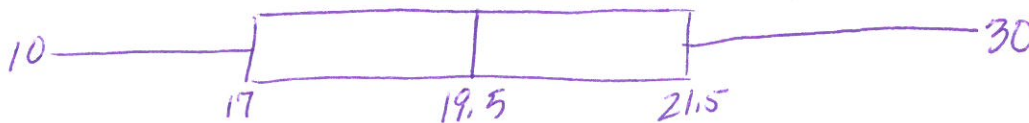
The rule is also called the 68-95-99.7 Rule or the Three Sigma Rule.



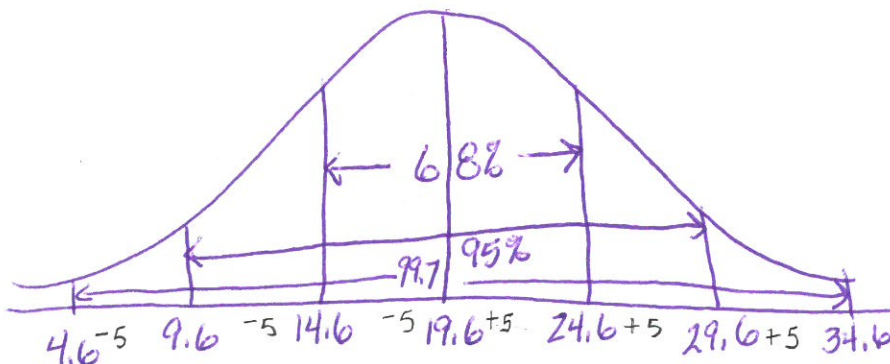
Example: 10 15 17 17 18 19 20 21 21 22 25 30

$$\bar{X} = 19.6$$

$$S = 5$$



p. 33



p. 35