Math 113: Classroom Activity 1 Name : _____
10 pts

Materials Needed:

Stopwatch, straps.

Instructions:

Divide into teams of three people.

We will be determining the time it takes to complete a four-legged walk of a pre-determined distance. Each team of three should stand side by side and strap their legs together at the ankles. This is similar to a three-legged race except the middle person will have both legs strapped to another person.

Once the legs are strapped together, walk the length of the course and record the time it takes to finish. Then rearrange the order of the group and repeat the process so that each person has a chance to be in the middle once.

You should find two people not in your group to help with this. One of them can be the timer and one can be the recorder. A note for the timer and recorder – do not round the times off to the nearest second, give them with the two decimal places that the stopwatch gives.

1. Record the first names of the persons in each position and the time in seconds that it takes to complete the walk.

Heat	Left	Middle	Right	Time
1				
2				
3				

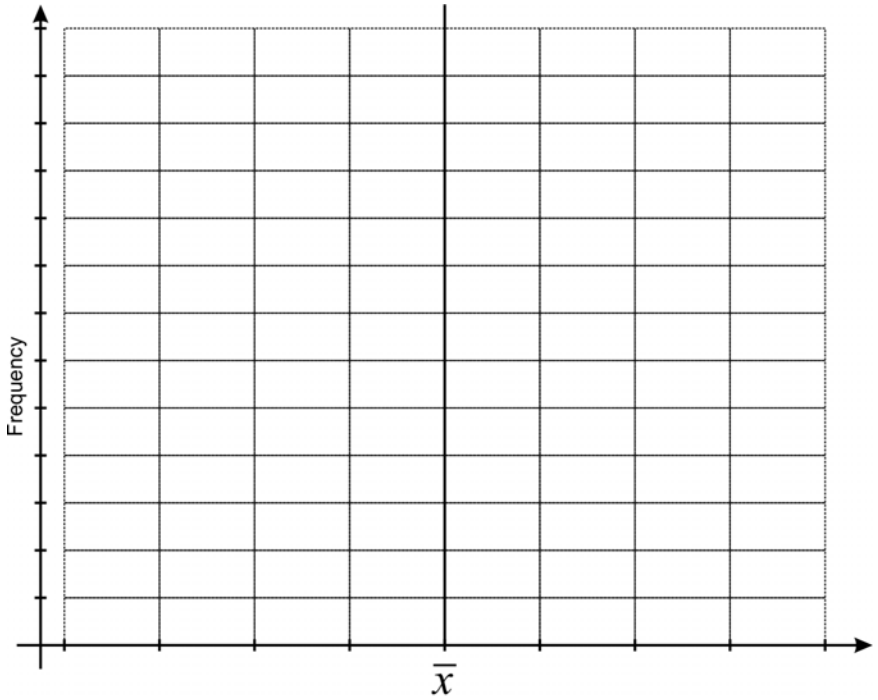
Give your results to the instructor, who will combine the data and provide a datafile for your use.

Use the combined class data to answer the remaining questions.

2. Summarize the **time** variable. Do this for each heat as well as the combined data.

Heat	**1**	**2**	**3**	**Combined**
Sample Size				
Mean				
Median				
Standard Deviation				
Variance				

3. Generate a histogram that displays the region from $\overline{x} - 3s$ to $\overline{x} + 3s$ in six equal intervals of one standard deviation each. Label the boundary values for the histogram along the horizontal axis. The chart has room to go ±4 standard deviations away from the mean, just in case you have some outliers.



4. Use the chart in question 3 to find the percent of the total values that lie within 1, 2, and 3 standard deviations of the mean and record them in the table.

   a. Complete the table with the percent of values.

% of values	w/in 1 std. dev.	w/in 2 std. devs.	w/in 3 std. devs.
Our sample data			
Empirical Rule	≈ 68%	≈ 95%	≈ 99.7%
Chebyshev	Not Applicable	≥ 75%	≥ 88.9%

   b. Compare our results with the theoretical values for the empirical rule and Chebyshev's theorem. This empirical rule is only for unimodal, bell-shaped data while Chebyshev's theorem is supposed to apply to any distribution.

      yes no Does the Empirical Rule apply to our data?

      yes no Is Chebyshev's Theorem true for our data?

5. Perform a one-way analysis of variance test and record the results in the table. The *time* is the response variable and the *heat* is the factor.

Source	SS	df	MS	F	P
Heat					
Error					
Total					

   a. Find $MS(total) = SS(total) \div df(total)$. How does this value compare with the variance of the combined data found in question 2?

   b. The P, short for p-value, is the probability of getting the results we got if the mean times for each heat are the same. If the p-value is less than 0.05, then we say it is very unlikely that the means are the same. Is there enough evidence to say the means are different?