

# STATISTICS/MATH 103 – 2211/1760

## SHANNON MYERS

$\pi$  100 POINTS POSSIBLE

$\pi$  YOUR WORK MUST SUPPORT YOUR ANSWER FOR FULL CREDIT TO BE AWARDED

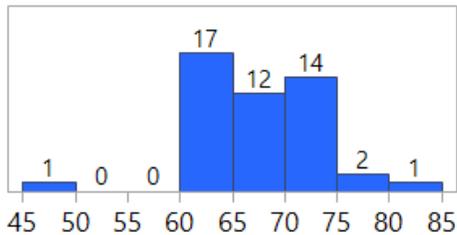
$\pi$  YOU MAY USE A SCIENTIFIC AND/OR A TI-83/84/85/86 CALCULATOR



ONCE YOU BEGIN THE EXAM, YOU MAY NOT LEAVE THE PROCTORING CENTER UNTIL YOU ARE FINISHED...THIS MEANS NO BATHROOM BREAKS!

NAME Key

- CREDIT WILL BE AWARDED BASED ON WORK SHOWN
    - THERE WILL BE NO CREDIT FOR UNSUPPORTED WORK
  - PLEASE PRESENT YOUR WORK IN AN ORGANIZED, EASY TO READ FASHION
  - DO NOT USE THE STAT MENU OF YOUR CALCULATOR UNLESS IT'S STATED IN THE INSTRUCTIONS FOR THE PROBLEM
1. (25 POINTS) Consider the histogram below, which represents the height of each student in Shannon's statistics classes to complete the tasks.



a. (4 POINTS) The majority of the data falls between

60 and 75 inches.

b. (3 POINTS) 36.26 % of all the heights fall between 60 and 65 inches.

$$\sum f = 1 + 17 + 12 + 14 + 2 + 1 = 47 \rightarrow \frac{17}{47} \cdot 100 \approx 36.26$$

c. (10 POINTS) Please make the frequency table which corresponds to the histogram.

Height (in inches)	Frequency	midpoint	f · midpoint
45 - 49.9	1	47.45	47.45
50 - 54.9	0	52.45	0
55 - 59.9	0	57.45	0
60 - 64.9	17	62.45	1061.65
65 - 69.9	12	67.45	809.4
70 - 74.9	14	72.45	1014.3
75 - 79.9	2	77.45	154.9
80 - 84.9	1	82.45	82.45
Total	47	//////	3170.15

d. (8 POINTS) Using your table, please find the mean height of a student in Shannon statistics classes.

$$M = \frac{\sum f \cdot \text{class midpoint}}{\sum f}$$

and midpoint is found by summing the endpoints of each class and dividing by 2.

$$M = \frac{3170.15}{47} \approx 67.45 \text{ inches}$$

e. (5 POINTS) Demonstrate your knowledge of statistics! What do you notice about this distribution? What other information could Shannon have collected to better summarize the distribution of student heights? Please go in depth!

The seems to be 2 classes that stand out, 60-64.9 inches and 70-74.9 inches. I bet if Shannon had made 2 histograms, one with female heights and the with male heights, we'd have a better summary.

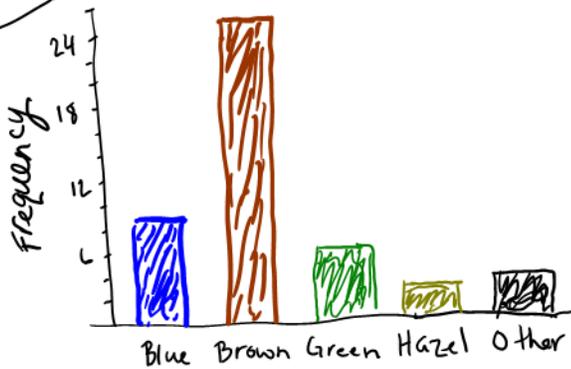
2. (25 POINTS) The data below represents the eye color of everyone in our class.

blue ✓      blue ✓      hazel ✓      brown ✓      green ✓      brown ✓  
 blue ✓      brown ✓      brown ✓      hazel ✓      other ✓      brown ✓  
 brown ✓      brown ✓      green ✓      blue ✓      other ✓      brown ✓  
 brown ✓      green ✓      brown ✓      brown ✓      brown ✓      brown ✓  
 blue ✓      brown ✓      brown ✓      brown ✓      brown ✓      other ✓  
 blue ✓      brown ✓      blue ✓      blue ✓      brown ✓      blue ✓  
 green ✓      brown ✓      green ✓      brown ✓      brown ✓      other ✓  
 brown ✓      green ✓      brown ✓      brown ✓      hazel ✓

a. (7 POINTS) Please organize this data using a table.

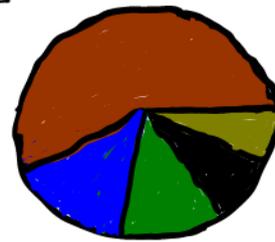
eye color	frequency	rel. frequency
Blue	9	19.1%
Brown	25	53.2%
Green	6	12.8%
Hazel	3	6.4%
Other	4	8.5%
total	47	100%

Bar Chart



b. (10 POINTS) Please illustrate this data using an appropriate graph or chart.

Pie chart



Blue  
 Brown  
 Green  
 Hazel  
 Other

c. (2 POINTS) This data is (circle one):

quantitative

qualitative

d. (2 POINTS) The variable is (circle one):

numerical

categorical

e. (2 POINTS) The best measure of for this data is (circle one):

mean

median

mode

f. (2 POINTS) The distribution of eye color in our class is/has (circle one):

no mode

one mode

bimodal

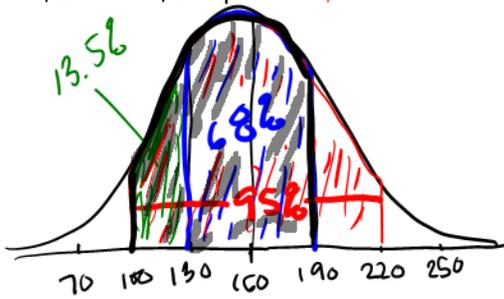
multimodal

3

most of the people  
 in our class have brown eyes

3. (10 POINTS) A random sampling of households in Leucadia indicated that the average monthly amount spent on home phone, television, and internet was \$160 for all three services with a standard deviation of \$30. The data is symmetric.

a. (3 POINTS) Please use the empirical rule to find the percentage of households which spend between \$100 and \$190 per month on these services.



$$\begin{array}{r} 95\% \\ - 68\% \\ \hline 27\% \end{array}$$

and  $27\% \div 2 = 13.5\%$

$$\begin{array}{r} 68\% \\ + 13.5\% \\ \hline 81.5\% \end{array}$$

About 81.5% of households in Leucadia spend between \$100 and \$190 on home phone, internet, and tv.

b. (2 POINTS) Please find and interpret the z-score corresponding to a household that spends \$160 per month.

$$z = \frac{x - \bar{x}}{s}$$

$$\bar{x} = 160$$

$$s = 30$$

$$x = 160$$

$z = 0$ . This means that the datum of \$160 is zero standard deviations away from the mean.

c. (3 POINTS) Would you be surprised if someone you knew from Leucadia spent \$230 per month on these services? Please explain using your amazing statistical knowledge!

Yes because a datum of \$230 is more than two standard deviations away from the mean.

4. (10 POINTS, 2 POINTS EACH) Please circle the correct response to each statement.

a.  T    F    A z-score measures the number of standard deviations a data value is from the mean.

b.  T    F    A left-tailed distribution means that the mean is to the left of the hump or peak.

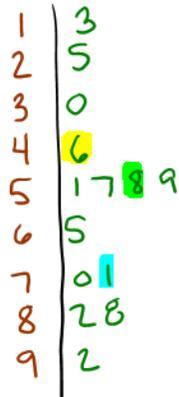
c. T     F    The median is the best measure of center for categorical variables.

d. Yes     No    Your brother told you he scored in the 100<sup>th</sup> percentile on a standardized test. Is this possible?

5. (20) Consider the random sample of MiraCosta College students at the Oceanside campus which measures the amount of time, in minutes, that students spent on their phones during a 10-minute break.

2.5' 9.2' 7.1' 3.0' 5.8' 8.8' 1.3' 4.6' 5.7' 7.0' 8.2' 6.5' 5.9' 5.1'

- a. (4 POINTS) Please make the stem and leaf plot for this data.



Key: 2|5 = 2.5 minutes

- b. (4 POINTS) Calculate and clearly label the 5-number summary.

1) Find med:  $\tilde{x} = \frac{5.8 + 5.9}{2} = 5.85$  or  $\tilde{x} = P_{50} = 5.8$

2) Find  $Q_1 = P_{25} = 4.6$

$L = \frac{25}{100} \cdot 14 = 3.5 \rightarrow 4$

3) Find  $Q_3$ :  $L = \frac{50}{100} \cdot 14 = 7$

$Q_3 = P_{75} = 7.1$

$L = \frac{75}{100} \cdot 14 = 10.5 \rightarrow 11$

5-number summary:  
in minutes  
1.3, 4.6, 5.85, 7.1, 9.2  
or  
1.3, 4.6, 5.8, 7.1, 9.2

- c. (4 POINTS) Check for outliers.

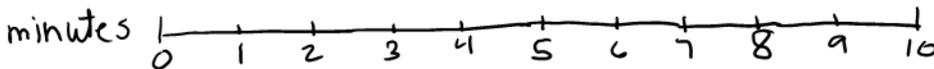
$(1.5)(IQR) = (1.5)(7.1 - 4.6)$   
 $= (1.5)(2.5)$   
 $= 3.75$  minutes

$Q_1 - (1.5)(IQR) = 4.6 - 3.75 = 0.85$  minutes

$Q_3 + (1.5)(IQR) = 7.1 + 3.75 = 10.85$  minutes

no outliers

- d. (4 POINTS) Draw and clearly label a boxplot.

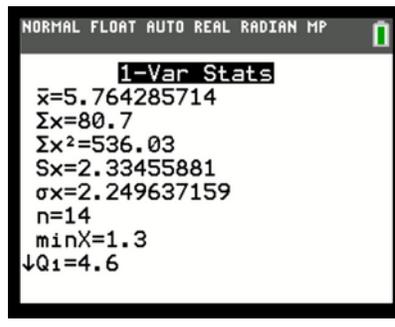
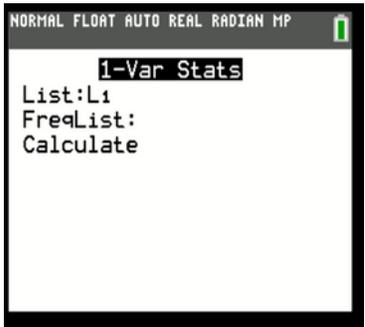
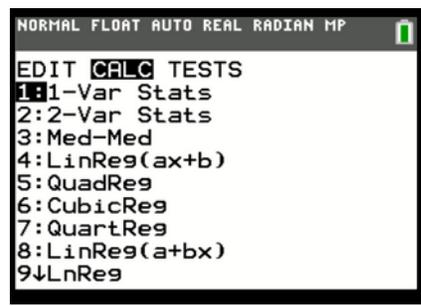
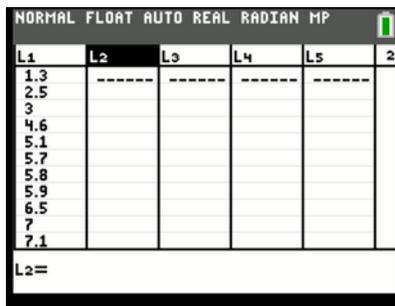
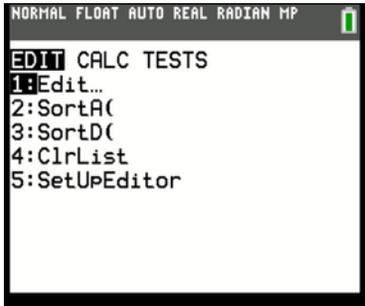


- e. (4 POINTS) Use your calculator's STAT menu to find the mean and standard deviation.

$\bar{x} \approx 5.76$  minutes

$s = 2.33$  minutes

OPTIONAL: (UP TO 10 POINTS—NO EXAM SCORES MAY EXCEED 100%) Assess your own learning! Think about the first third of our class. What have you learned about descriptive statistics? Have you applied any of this knowledge? This portion of the exam is especially for those folks who blanked out on a problem...hey...maybe now that you've written out what you know, you might be able to figure out that pesky problem 😊



# Math 103/Myers/Formulas for Exam 1

For this exam, you'll only need the formulas for samples.

## Mean

Arithmetic Mean

$$\bar{x} = \frac{\sum x}{n}$$

Mean (Frequency Table)

$$\bar{x} = \frac{\sum f \cdot x}{\sum f}$$

Weighted Mean

$$\bar{x} = \frac{\sum w \cdot x}{\sum w}$$

## Standard Deviation and Variance: (I only showed you version 1)

Version 1

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

Version 2

$$s = \sqrt{\frac{n \sum (x^2) - (\sum x)^2}{n(n - 1)}}$$

variance =  $s^2$

## Percentiles

Percentile of  $x = \frac{\# \text{ of data values below } x}{n} \cdot 100$

Location of the  $k^{\text{th}}$  Percentile:  $L = \frac{k}{100} \cdot n$