Activity 4
Determining Mean and Median of a Frequency Distribution Table

Topic Area: Data Analysis and Probability

NCTM Standard: Select and use appropriate statistical methods to analyze data.

Objective: The student will be able to utilize the Casio fx-9860G Plus calculator to determine the measures of central tendency of a frequency distribution table for the various activities included in this unit.

Introduction: This activity is designed to demonstrate the procedure to enter data into the Casio fx-9860G Plus graphing calculator in order to determine the measures of central tendency of a frequency distribution table and to use interpolation in order to evaluate a given large set of data.

The students should be familiar with the following vocabulary.

Cumulative frequency
Frequency
Interpolation
Mean
Median
Median Class
Mode
Proportions

Calculator Notes for Activity 4

Objective: The student will be able to utilize the Casio fx-9860G Plus calculator to determine the measures of central tendency of a frequency distribution table for the various activities included in this unit.

Steps for Determining Mean and Median of a Frequency Distribution Table

Problem: The following are scores that 220 students received on a 100 point exam. Use the fx-9860G Plus graphing calculator to determine the mean and median of the data using the frequency distribution table.

Intervals	Class Marks	Frequency
0-10	5	1
10-20	15	1
20-30	25	3
30-40	35	2
40-50	45	4
50-60	55	3
60-70	65	18
70-80	75	52
80-90	85	98
90-100	95	38

The new method is needed because data can consist of many more items than just 220. If this same test was administered to every 11th grade student in the United States, the data would be too extensive to add the scores and divide by the number of scores. The formula to find the mean of the data in a frequency distribution is as follows:

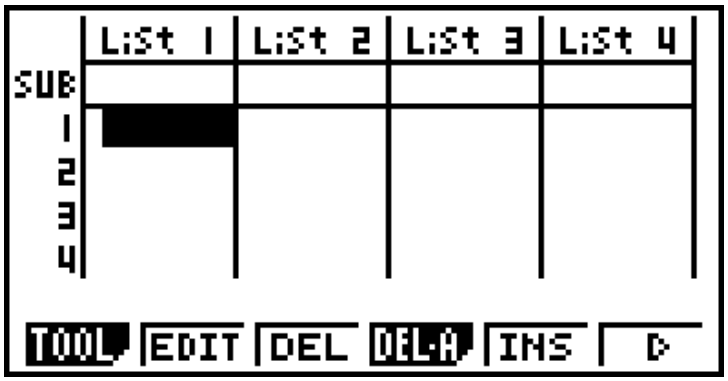
$$\bar{X} = \frac{\sum_{i=1}^{k} (f_i \times X_i)}{\sum_{i=1}^{k} f_i}$$

Where X = class marks, f = frequencies, and k = the number of intervals.

To make the frequency distribution table on the calculator, start by turning on the calculator, Go to STAT and clear the screen. Use the following key strokes:

O$lBBBurq

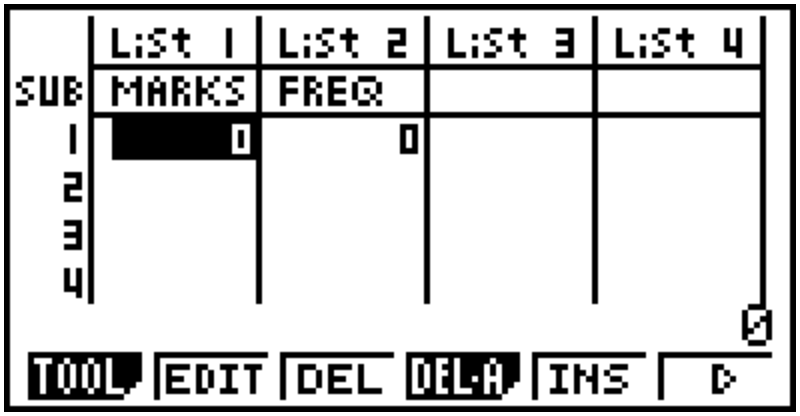
Your screen should look like this:



When putting a frequency distribution table into the calculator, list 1 should be the class marks and list 2 should be the frequency. Start by labeling list 1 MARKS and list 2 FREQ. Use the following key strokes:

BLa7f6,mlLa$Bk6j5l!

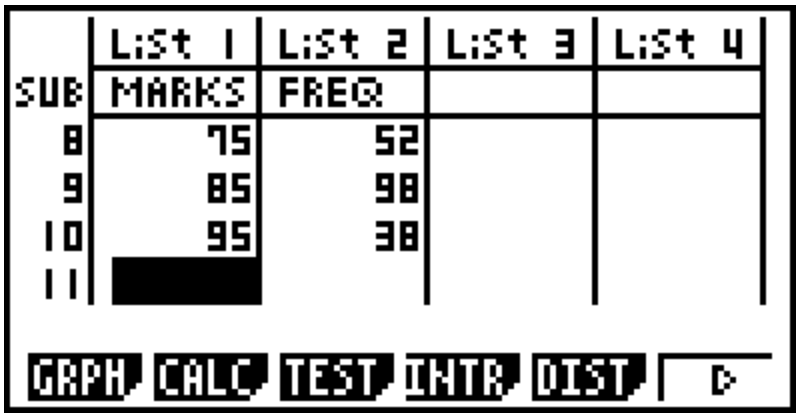
Your screen should look like this:



Now, you are ready to enter the class marks into list 1 and frequencies into list 2. Use the following key strokes.

5l5l25l35l45l55l65l75l85l95l$1l1l3l2l4l3l18l52l98l38l

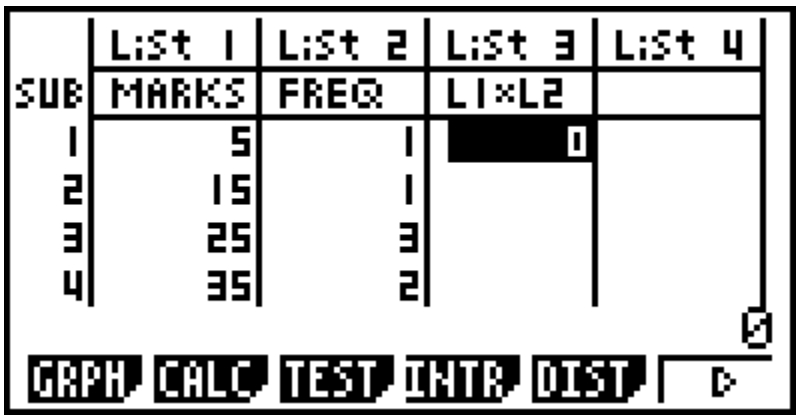
Your screen should look like this:



Next, label list 3 L1XL2 since you will need to multiply List 1 x List 2 (class marks x frequency). To do this, use the following key strokes:

$Bab1mab2l

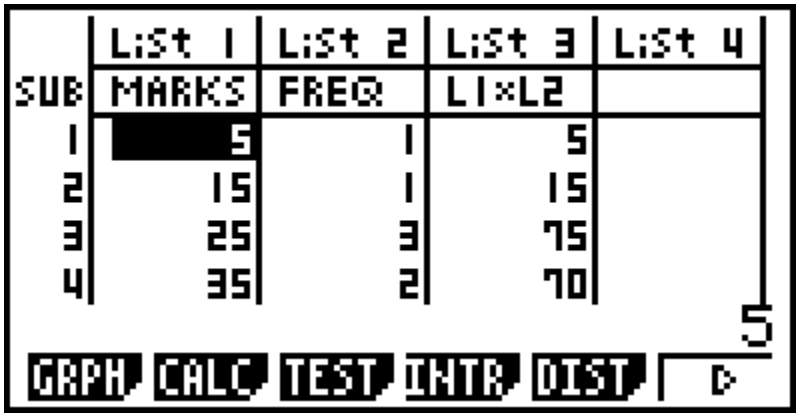
Your screen should look like this:



You do not need to multiply all the numbers in list 1 by all the numbers in list 2. You can use the storage capabilities of the calculator and command the calculator to multiply the lists and store the answers in list 3. Notice that you need to go to the run mode to do this. Use the following keystrokes to do this:

dp!liqq1mq2bq3ldp$l

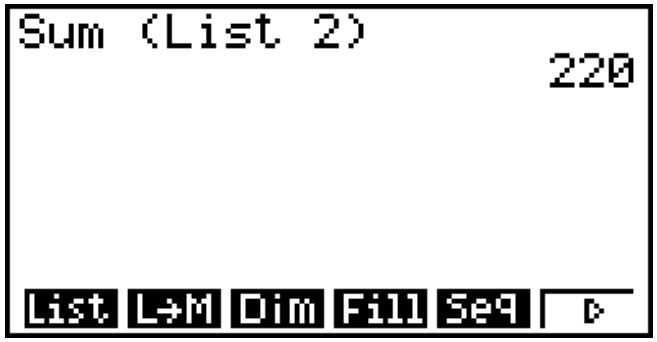
Your screen should look like this:



Next, you need to find the sums of list 2 (frequency) and list 3 (class marks x frequency). The calculator will do this but notice that again you need to return to the run mode. Use the following keystrokes to find the sum of list 2:

p1iquuqjuq2kl

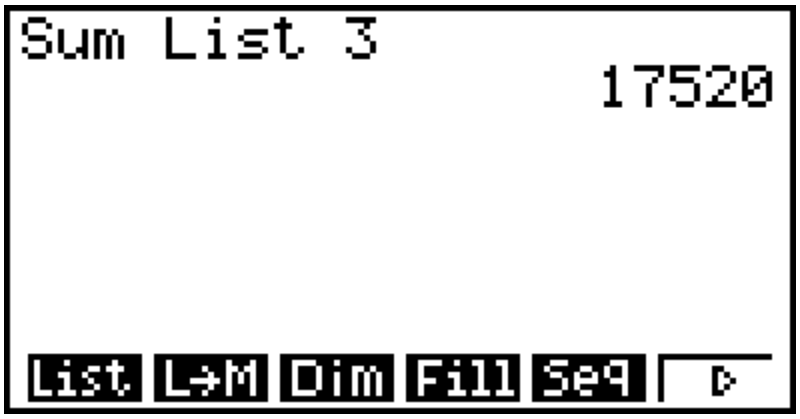
This should be your screen:



The sum of List 2 = 220. Do the same for List 3 using the following keystrokes:

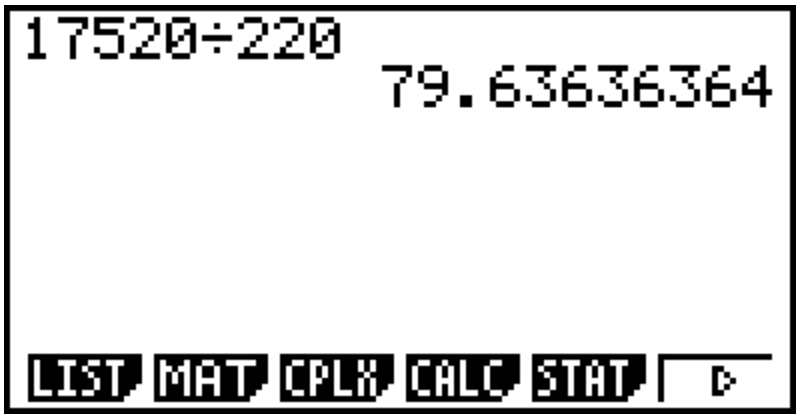
uuquq3l

This should be your screen:



The sum of List 3 = 17520.

To find the mean of the frequency distribution table, divide these two answers.



Therefore, the mean is 79.63636364 or 79.64.

To determine the median of a frequency distribution table, you need to use the cumulative frequencies and the actual

class intervals. The cumulative frequencies are found by just adding the frequency of each item to the previous frequency. Since the first frequency is 1 and the second is 1, the cumulative frequency is 1+1 or 2. Since the next frequency is 3, the cumulative frequency will be 2+3 or 5, and so on. The new table will look like this:

Intervals	Cumulative Frequency
0-10	1
10-20	2
20-30	5
30-40	7
40-50	11
50-60	14
60-70	32
70-80	84
80-90	182
90-100	220

Since the median is the value where 50% of your data is above and 50% is below, the median would fall somewhere in the interval 80-90. This interval is called the median class. To find the median, you will use a set of proportions or interpolation to find the number.

This is what you know from the table:

182 scores lie below 90
110 scores lie below the median
84 scores lie below 80

182 – 84 = 98
110 – 84 = 26
Median – 80 = x
90 – 80 = 10

Therefore, your proportion will be:

$$\frac{98}{26} = \frac{10}{X}$$

Solving for X
98X = 260
X = 2.653061224
X = 2.65
Median = 80 + 2.65 = 82.65

Name_____Class_____Date_____

Activity 4: Worksheet
Determining Mean and Median of a Frequency Distribution Table

For each frequency distribution tables, determine the mean and median.

1.

Interval	Frequency
25-30	4
30-35	9
35-40	12
40-45	16
45-50	28
50-55	12
55-60	5

2.

Interval	Frequency
16-24	8
24-32	11
32-40	30
40-48	10
48-56	12
56-64	9

3.

Interval	Frequency
19-22	4
22-25	7
25-28	6
28-31	9
31-34	12
34-37	18
37-40	10
40-43	8
43-46	6
46-49	2

4.

Interval	Frequency
20-30	7
30-40	9
40-50	12
50-60	17
60-70	48
70-80	37
80-90	27
90-100	18
100-110	15

Solutions to Activity 4 Worksheet

1. mean = 43.95

   median = 45.36

2. mean = 39.4

   median = 37.6

3. mean = 33.89

   median = 34.5

4. mean = 70.74

   median = 70.54