Section 3.2 Worksheet – Measures of Central Tendency

MDM4U

David Chen

1) Use technology to calculate the mean, median, and mode for the following samples. Then use the relative location of the mean, median, and mode to describe the sets as symmetric, skewed left, or skewed right.

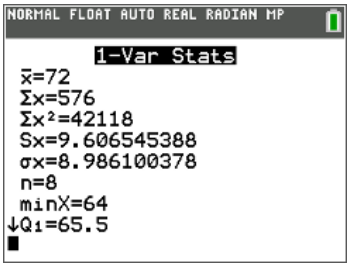
a) Marks on a set of tests {66, 65, 72, 78, 93, 70, 68, 64}

$\bar{x} = 72$

$median = 69$

$mode = none$

$mean > median; skewed\ right$



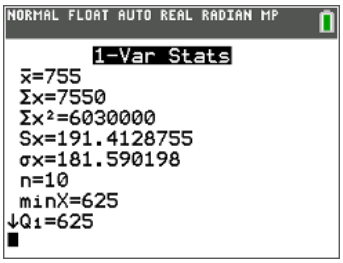
b) Monthly rent ($) {625, 750, 800, 650, 725, 850, 625, 650, 625, 1250}

$\bar{x} = 755$

$median = 687.5$

$mode = 625$

$mean > median > mode; skewed\ right$



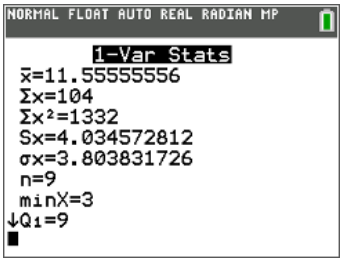
c) Points scored by a basketball player {12, 15, 8, 12, 15, 10, 3, 14, 15}

$\bar{x} = 11.56$

$median = 12$

$mode = 15$

$mean < median < mode; skewed\ left$

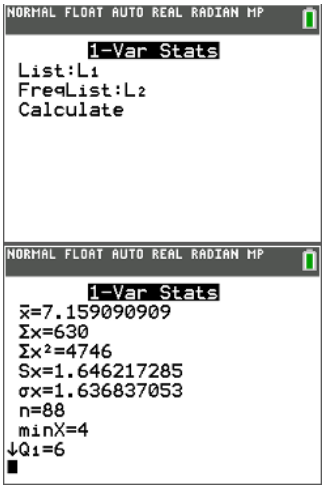


2) Here is a sample of Hakim's Shoes reported sales results:

Size	4	5	6	7	8	9	10
Frequency	5	11	15	18	19	13	7

a) Calculate the mean, median, and mode shoe size by hand.

$$\bar{x} = \frac{\sum xf}{\sum f} = \frac{4(5) + 5(11) + 6(15) + 7(18) + 8(19) + 9(13) + 10(7)}{5 + 11 + 15 + 18 + 19 + 13 + 7} = \frac{630}{88} = 7.16$$



$median: \frac{88+1}{2} = 44.5$ the median data value is between the 44th and 45th piece of data. If we look at cumulative frequencies, this falls within the size 7 category.

$median = 7$

$mode = 8$

b) Which measure of central tendency is most appropriate? Why?

Mode tells you the most popular size

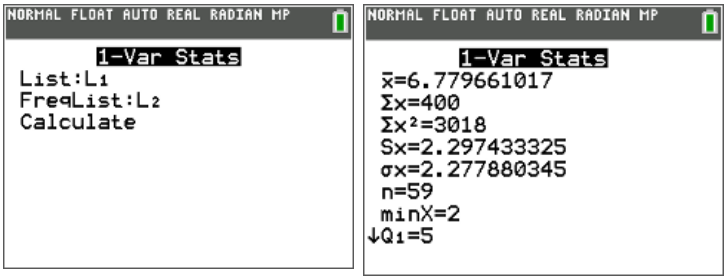
3) A pair of dice is rolled numerous times. The sum of the dice, as well as the frequency, is recorded. Calculate the mean, median, and mode for the results using technology.

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	2	3	5	7	9	11	8	7	4	2	1

$\bar{x} = 6.78$

$median = 7$

$mode = 7$



4) Jasmine records the dates on 125 pennies. Find the mean date of the sample by hand. Check your answer using technology.

Date	1990 --- 1999	1980 --- 1989	1970 --- 1979	1960 --- 1969
Frequency	56	42	21	6

Solution using a table:

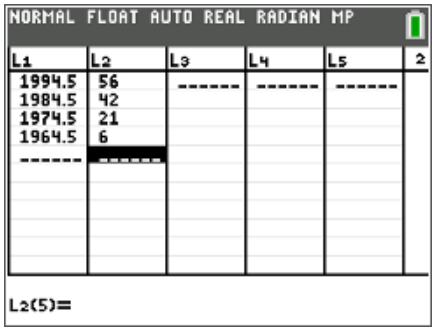
Date	**Frequency, f**	**Midpoint of date, m**	**$f \times m$**
1990 – 1999	56	1994.5	111 692
1980 – 1989	42	1984.5	83 349
1970 – 1979	21	1974.5	41 464.5
1960 – 1969	6	1964.5	11 787
	$\sum f = 125$		$\sum m \times f = 248\ 292.5$

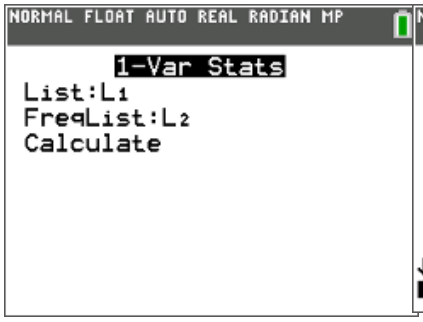
$$\bar{x} = \frac{\sum mf}{\sum f} = \frac{248\ 292.5}{125} = 1986.34$$

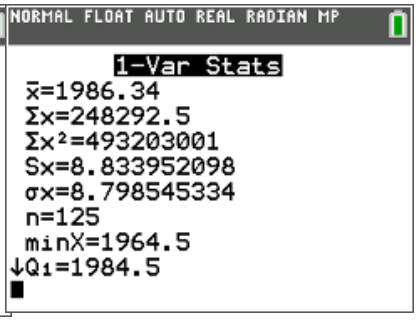
Solution without table:

$$\bar{x} = \frac{\sum mf}{\sum f} = \frac{1994.5(56) + 1984.5(42) + 1974.5(21) + 1964.5(6)}{56 + 42 + 21 + 6} = \frac{248\ 292.5}{125} = 1986.34$$

Check answer with calculator:







5) A student's term mark is 75. The term mark counts for 70% of the final mark. What mark must the student achieve on the exam to earn a final mark of…

a) 70

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

$70 = \frac{75(0.7) + x(0.3)}{0.7 + 0.3}$

$70 = 52.5 + x(0.3)$

$17.5 = x(0.3)$

$\frac{17.5}{0.3} = x$

$x = 58.33$

The student must get a 58.33% on the final exam to earn a final mark of 70%.

b) 70

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

$80 = \frac{75(0.7) + x(0.3)}{0.7 + 0.3}$

$80 = 52.5 + x(0.3)$

$27.5 = x(0.3)$

$\frac{27.5}{0.3} = x$

$x = 91.67$

The student must get a 91.67% on the final exam to earn a final mark of 80%.

6) The following table shows the salary structure of Statsville Plush Toys, Inc. Assume that salaries exactly on an interval boundary have been placed in the higher interval. Calculate the mean salary by hand. Check your answer using technology.

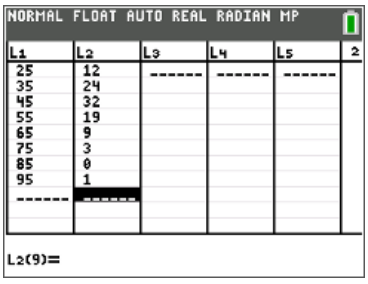
Salary Range ($000)	Number of Employees, f	Midpoint of Salary, m	$f \times m$
20 – 30	12	25	300
30 – 40	24	35	840
40 – 50	32	45	1440
50 – 60	19	55	1045
60 – 70	9	65	585
70 – 80	3	75	225
80 – 90	0	85	0
90 – 100	1	95	95
	$\sum f = 100$		$\sum f \times m = 4530$

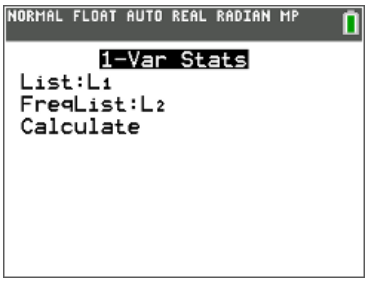
$$\bar{x} = \frac{\sum mf}{\sum f} = \frac{4530}{100} = 45.3$$

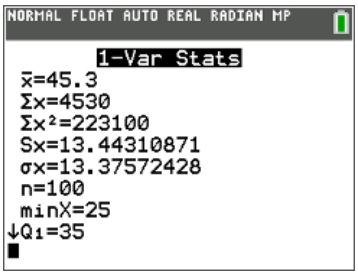
OR without table:

$$\bar{x} = \frac{\sum mf}{\sum f} = \frac{25(12) + 35(24) + 45(32) + 55(19) + 65(9) + 75(3) + 85(0) + 95(1)}{12 + 24 + 32 + 19 + 9 + 3 + 0 + 1} = \frac{4530}{100} = 45.3$$

Check answer with calculator:







The mean salary is about $45 300.