Statistics
Spring 2023
Lecture 3

Feb 19-8:47 AM

TI instructions:

1) To clear the screen — Clear

2) To quit — 2nd MODE

3) To clear all lists — 2nd + 4: ClearAllLists Enter

4) To reset all lists — STAT Edit 5: Set Up Editor Enter

Let's quit and clear the screen

2nd MODE Clear

Feb 21-6:50 PM

How to store data in a list:

Store the following sample in L1

15 12 18 20 25

12 10 19 32 28

STAT Edit

1: Edit

L1

15 enter

12 enter

18 enter

⋮

28 enter

Quit & clear the Screen

2nd MODE clear

Feb 21-6:57 PM

How to view element in L1:

2nd 1 Enter

{15 12 18 . . . 28}

To Sort what is in L1:

STAT Edit 2nd 1 Enter

2: SortA(

Now let's view L1 again

2nd 1 Enter

L1

{10 12 12 15 . . . 32}

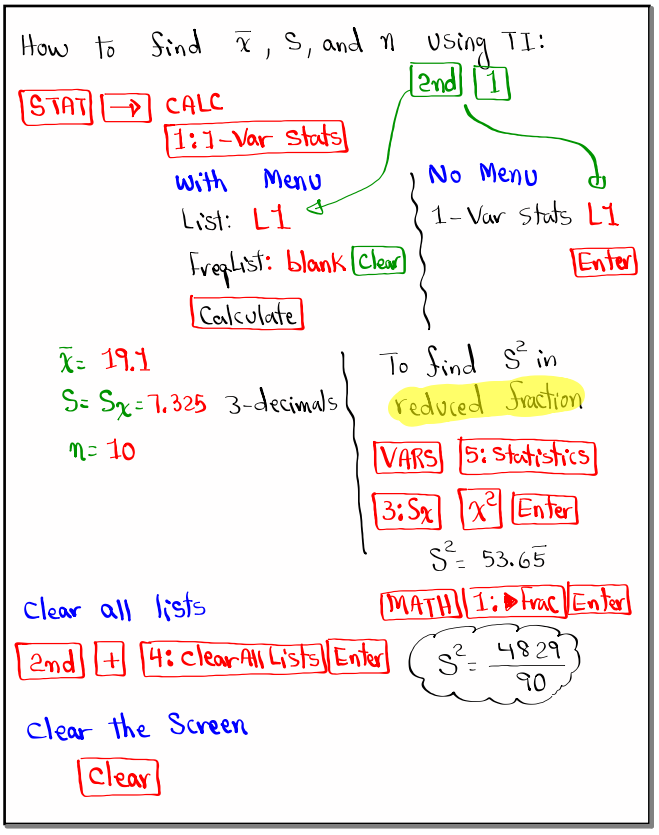
Min = 10 Max = 32 Range = Max − Min = 22

Midrange = $\frac{\text{Max} + \text{Min}}{2}$ = 21

Let's clear the Screen

Clear

Feb 21-7:03 PM



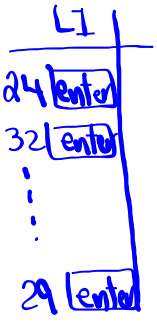
Feb 21-7:13 PM

I randomly selected 20 students, here are their ages:

24	32	19	20	25
35	18	19	40	42
38	24	24	34	45
27	25	25	36	29

Let's store this in L1:

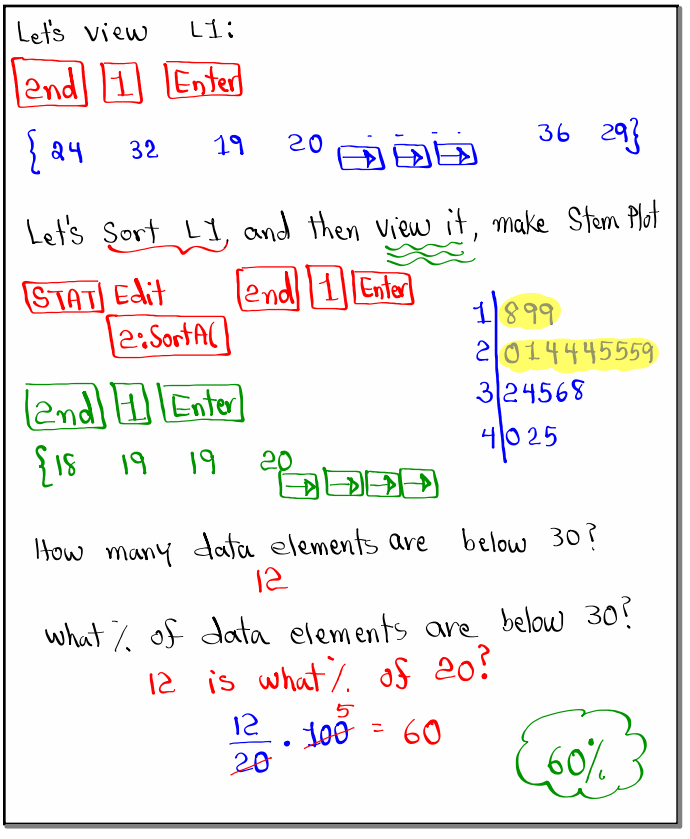
STAT Edit
1:Edit



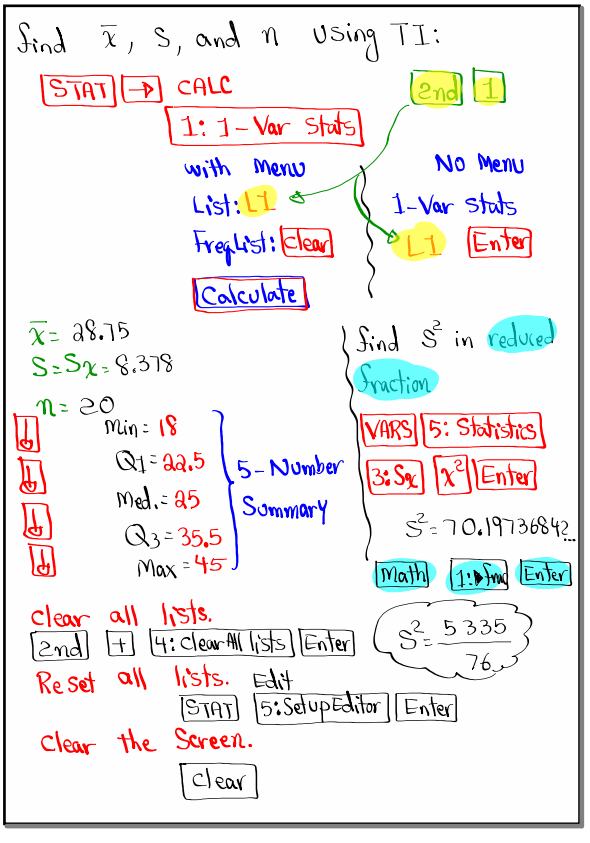
Use ↑ to check all enteries for accuracy. Let's quit & clear the Screen

2nd MODE Clear

Feb 21-7:28 PM



Feb 21-7:34 PM



Feb 21-7:44 PM

Complete the Freq. table below:

class limits	class BNDRS	class MP	class F	Cum. F	Rel. F	% F
32 – 40	31.5 – 40.5	36	4	4	.16	16%
41 – 49	40.5 – 49.5	45	10	14	.40	40%
50 – 58	49.5 – 58.5	54	6	20	.24	24%
59 – 67	58.5 – 67.5	63	5	25	.20	20%

CW = 9 , $n = 25$ Rel. F = $\frac{f}{n} = \frac{f}{25}$

How to find $\bar{x}$, S, and n for grouped data:

class MP → L1

class F → L2

STAT Edit 1:Edit

L1	L2
36	4
45	10
54	6
63	5

STAT → CALC

1: 1-Var Stats

with Menu

List: L1

Freqlist: L2

Calculate

2nd 1

No Menu

1-Var Stats

L1 , L2 enter

7

$\bar{x} = 49.32$

$S = S_x = 9.045$

$n = 25$

2nd 2

Find S^2 in reduced fraction

VARS 5: Statistics 3: S_x

x^2 Enter $S^2 = 81.81$

MATH 1: ▸Frac Enter

$S^2 = \frac{8181}{100}$

Feb 21-8:11 PM

Clear all lists

use the chart below to find

class MP (L1)	class F (L2)
54	5
64	10
74	15
84	12
94	8

$\bar{x} = 75.6$

$S = 12.182$

$n = 50$

S^2 (Reduced fraction)

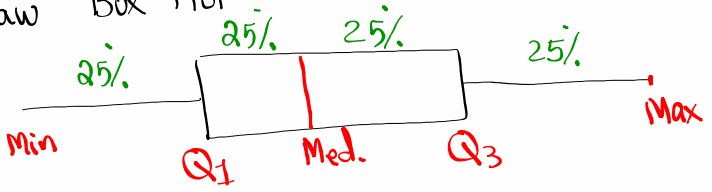
$S^2 = \frac{7272}{49}$

Feb 21-8:34 PM

5- Number Summary

Min Q_1 Med. Q_3 Max

Draw Box Plot



$IQR = Q_3 - Q_1$

Inter-Quartile-Range

Upper fence $= Q_3 + 1.5(IQR)$

Lower fence $= Q_1 - 1.5(IQR)$

Feb 21-8:39 PM

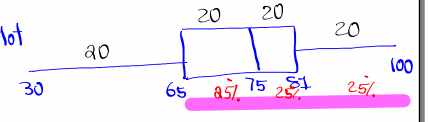
I randomly selected 80 exams. The 5-Number Summary of Scores are

80÷4=20

30 65 75 81 100

↑ Min. ↑ Q1 ↑ Med. ↑ Q3 ↑ Max

Box Plot



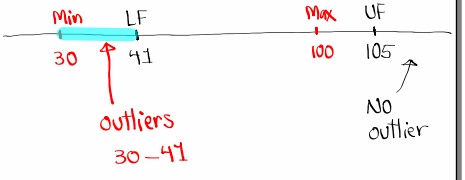
$IQR = Q_3 - Q_1 = 81 - 65 = \boxed{16}$

Upper fence $= Q_3 + 1.5(IQR)$

$= 81 + 1.5(16) = \boxed{105}$

Lower fence $= Q_1 - 1.5(IQR)$

$= 65 - 1.5(16) = \boxed{41}$



what % of data elements are above 65?

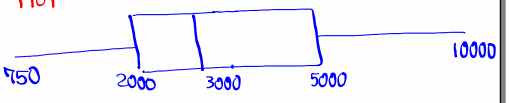
75%

Feb 21-8:43 PM

I randomly selected 40 nurses. 5-Number of their monthly Salary are below

750	2000	3000	5000	10000
↑ Min	↑ Q_1	↑ Med.	↑ Q_3	↑ Max

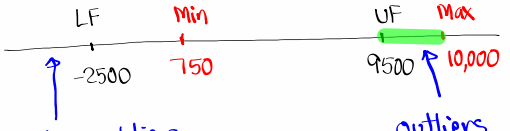
Box Plot



$IQR = Q_3 - Q_1 = 5000 - 2000 = 3000$

Upper fence $= Q_3 + 1.5(IQR)$
$= 5000 + 1.5(3000) = \boxed{9500}$

Lower fence $= Q_1 - 1.5(IQR)$
$= 2000 - 1.5(3000) = \boxed{-2500}$



No outliers — Outliers

Feb 21-8:52 PM

Empirical Rule:

It is best when mean = Mode = Median data distribution is Symmetric & Bell-Shape

68% Range $\Rightarrow \bar{x} \pm s$

95% Range $\Rightarrow \bar{x} \pm 2s$ Usual Range

99.7% Range $\Rightarrow \bar{x} \pm 3s$

Feb 21-8:59 PM

A sample of 200 students had a mean age of 32 Yrs with standard deviation of 5 Yrs. Assume ages had a symmetric dist.

$n = 200$

$\bar{x} = 32$

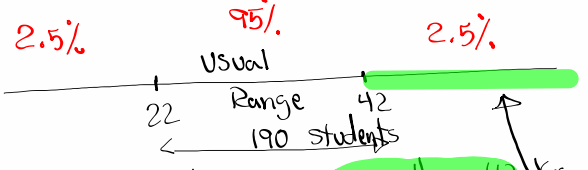
$S = 5$

68% Range $\Rightarrow \bar{x} \pm S = 32 \pm 5 \Rightarrow$ 27 to 37

95% Range $\Rightarrow \bar{x} \pm 2S = 32 \pm 2(5) \Rightarrow$ 22 to 42

Usual Range

99.7% Range $\Rightarrow \bar{x} \pm 3S \Rightarrow$ 17 to 47



How many students were more than 42 Yrs old?

2.5% of 200 = .025(200) = 5

Feb 21-9:03 PM

Z - Score

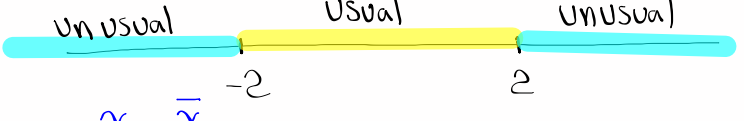
Always round to 3-decimal places.

It is a method to standardize data element.

It is a value that tells us how many standard deviations is data element above or below the mean.

If $-2 \le Z \le 2 \Rightarrow$ data element is usual.

If $Z < -2$ or $Z > 2 \Rightarrow$ data element is unusual.



$$Z = \frac{x - \bar{x}}{S}$$

Feb 21-9:10 PM

Given $\bar{x} = 84$, $S = 8$

1) Find Z-Score for $x = 95$.

$$Z = \frac{x - \bar{x}}{S} = \frac{95 - 84}{8} = \frac{11}{8} = 1.375$$

Since $-2 \le Z \le 2$ → Usual

2) Find x Such that $Z = -2.5$.

$$Z = \frac{x - \bar{x}}{S}$$

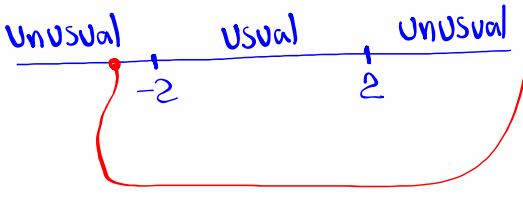
$$-2.5 = \frac{x - 84}{8}$$

→ Cross-Multiply

$$x - 84 = 8(-2.5)$$

$$x = 84 - 20$$

$x = 64$ Unusual Since $Z < -2$



Feb 21-9:16 PM

Lisa got 95 on exam 1 and 84 on exam 2.

To Compare these, we need Z-Scores.

Exam 1: $\bar{x} = 85$, $S = 10$

$$Z = \frac{x - \bar{x}}{S} = \frac{95 - 85}{10} = \frac{10}{10} = 1$$ Usual Score

Exam 2: $\bar{x} = 75$, $S = 4$

$$Z = \frac{x - \bar{x}}{S} = \frac{84 - 75}{4} = \frac{9}{4} = 2.25$$ Unusual Score

Z-Scores allow us to compare data elements from differen Samples.

Feb 21-9:21 PM