

Statistics

Lecture 4



Feb 19-8:47 AM

In - Person QZ 2

use Sample below

1 3 3 5

5 8 9 10

1) Mode = 3 & 5 ✓

2) $\sum x = 44$ ✓

$n = 8$

3) $\sum x^2 = 314$ ✓

$$\bar{x} = \frac{\sum x}{n} = \frac{44}{8} = \frac{22}{4} = \left[\frac{11}{2} \right] = 5.5$$

$$s^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{8 \cdot 314 - 44^2}{8(8-1)} = \frac{576}{56} = 10.286$$

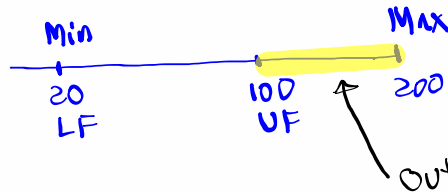
$$576 \div 56 \text{ [Enter] [MATH] 1: \rightarrow \text{frac} \text{ [Enter] } \frac{72}{7}$$

$$S = \sqrt{s^2} = \sqrt{\frac{72}{7}} \approx 3.207$$

Mar 15-10:54 AM

In - Person QZ 3

Given the Box Plot below



Find

$$1) IQR = Q_3 - Q_1 = 70 - 50 = \boxed{20}$$

$$2) \text{Upper Fence} = Q_3 + 1.5(IQR) = 70 + 1.5(20) = \boxed{100}$$

$$3) \text{Lower Fence} = Q_1 - 1.5(IQR) = 50 - 1.5(20) = \boxed{20}$$

$$\text{Range} = \text{Max} - \text{Min} = 200 - 20 = 180$$

$$\text{Estimation for } S \approx \frac{\text{Range}}{4} = \frac{180}{4} = \boxed{45}$$

Mar 22-7:48 AM

Consider the Stem Plot below

```

3 | 0 2 5
4 | 0 3 5 5 8
5 | 2 3 6 6 6 8 9
6 | 0 2 5 5 5 7 7 8 9
7 | 0 2 8
8 | 0

```

$$1) n = 28$$

$$2) \text{Range} = \text{Max} - \text{Min} = 80 - 30 = 50$$

$$3) \text{Midrange} = \frac{\text{Max} + \text{Min}}{2} = \frac{80 + 30}{2} = 55$$

$$4) \text{Mode} = 56 \hat{=} 65$$

$$5) \text{Estimate } S^2$$

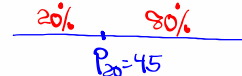
$$S \approx \frac{\text{Range}}{4} = \frac{50}{4} = \boxed{12.5}$$

$$S^2 \approx 12.5^2 \approx \boxed{156.25}$$

$$6) \text{Find } P_{20}$$

$$L = \frac{k}{100} \cdot n = \frac{20}{100} \cdot 28 = 5.6$$

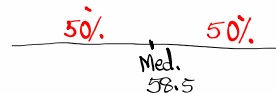
$$L = 6 \quad P_{20} = 6\text{th element} = 45$$



$$7) \text{Median } P_{50}$$

$$L = \frac{50}{100} \cdot 28 = 14$$

$$P_{50} = \frac{14\text{th element} + \text{Next one}}{2} = \frac{58 + 59}{2} = \boxed{58.5}$$



Mar 22-8:25 AM

3025
403558
52366689
6025557789
7028
80

8) Find k such that $P_k = 70$

Always Round to whole!

$$PR = k = \frac{B}{n} \cdot 100$$

below

$$= \frac{24}{28} \cdot 100 = 85.7 \dots \approx 86$$

86% 14%
70 $P_{86} = 70$

9) Find k such that $P_k = 40$

$$k = \frac{B}{n} \cdot 100 = \frac{3}{28} \cdot 100 \approx 11$$

$P_{11} = 40$

11% 89%
40

Mar 22-8:38 AM

A data set has a symmetric dist. with the mean of 125 and Variance of 36. $\bar{x} = 125$
 $s^2 = 36$

1) Find its standard deviation.
 $s = \sqrt{s^2} = \sqrt{36} = 6$

2) Find its 68% Range.
Empirical Rule $\bar{x} \pm s = 125 \pm 6 \Rightarrow [119 \text{ to } 131]$

3) Find its Usual Range.
95% Range
 $\bar{x} \pm 2s = 125 \pm 2(6) = 125 \pm 12 \Rightarrow [113 \text{ to } 137]$

4) Find the Z-Score for data element 100.
 $Z = \frac{x - \bar{x}}{s} = \frac{100 - 125}{6} = -\frac{25}{6} = -4.167$ Unusual $Z < -2$ or $Z > 2$
Round to 3-decimal places

5) Find the data element with Z-Score of 1.5.
 $Z = \frac{x - \bar{x}}{s}$
 $1.5 = \frac{x - 125}{6}$
Cross-multiply & solve for x .
 $x - 125 = 6(1.5)$
 $x - 125 = 9$
 $x = 134$

Mar 22-8:44 AM

Complete the chart below

class limits	class mp	class F	% F
12 - 20	16	4	16%
21 - 29	25	8	32%
30 - 38	34	10	40%
39 - 47	43	3	12%

1) Sample Size

$$n = \sum F = 4 + 8 + 10 + 3 = 25$$

2) class width

$$CW = 9$$

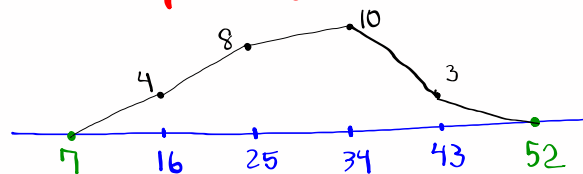
3) % below 30

$$16\% + 32\% = 48\%$$

4) % above 20

$$32\% + 40\% + 12\% = 84\%$$

5) Draw Freq. Polygon.



Mar 22-8:58 AM

TI instructions:

1) To clear the Screen.

clear

2) To quit.

2nd MODE

3) To clear all lists.

2nd + 4: Clear All Lists

Enter

4) To reset all lists.

STAT Edit

Enter

5: Set up Editor

5) To turn on the diagnostic Key.

2nd 0 ↓ ↓ ↓ ... ↓ Diagnostic On Enter Enter

Mar 22-9:09 AM

How to store data elements in a list:

Consider the Sample below

12 25 10 28 30
15 40 50 48 35

STAT **Edit**
1: Edit

L1
12 **Enter**
25 **Enter**
...
35 **Enter**

Let's quit & clear the Screen

2nd **Mode** **Clear**

To view L1

2nd **1** **Enter**

{ 12 25 10 ... 35 }
→ → →
← ← ←

Mar 22-9:18 AM

How to Sort data Set:

STAT **Edit**

2: SortA()

2nd **1** **Enter**
L1

Now let's view the result.

2nd **1** **Enter**

L1

{ 10 12 15 ... 50 }
→ → →
← ← ←

Mar 22-9:37 AM

How to find \bar{x} & S using Calc.

STAT \rightarrow **CALC**

1:1-Var Stats

$\bar{x} = 29.3$

$S = S_x = 14.229$

$n = 10$

$\text{Min} = 10$

$Q_1 = 15$

$\text{Med} = 29$

$Q_3 = 40$

$\text{Max} = 50$

with Menu

List: **L1**

Freq List: **clear**

Calculate

2nd **1**

No Menu

L1 **Enter**

Now finding S^2

VARX **5: Statistics** **3: Sx**

\bar{x}^2 **Enter**

$S^2 = 202.45$

Let's convert to a reduced fraction

MATH **1: Frac** **Enter**

$S^2 = \frac{18221}{90}$

Box Plot



$IQR = 40 - 15 = 25$

Upper Fence $40 + 1.5(25) = 77.5$

Lower Fence $15 - 1.5(25) = -22.5$

No outliers

Let's clear all lists, then quit & clear screen

2nd **+** **4:** **Enter**

2nd **Mode**

clear

Mar 22-9:41 AM

I randomly selected 20 students, and here are their ages

25	32	30	48	52
18	20	25	30	19
18	34	40	45	50
19	20	26	44	25

1) Store in **L1**.

after entering 25, use **2nd** **4** to check all entries.

2) Let's quit **2nd** **Mode**

3) Sort **L1**, then view it to make STEM plot

STAT **Edit**

2: SortA

2nd **1**

Enter

2nd **1**

Enter

1	8899
2	005556
3	0024
4	0458
5	02

Mar 22-9:56 AM

1 | 8899
2 | 005556
3 | 0024
4 | 0458
5 | 02

Find P_{10}

$$L = \frac{10}{100} \cdot 20 = 2$$

$$P_{10} = \frac{2^{\text{nd}} + 3^{\text{rd}}}{2} = \frac{18 + 19}{2} = 18.5$$

Find the percentile ranking for 40

$$K = \frac{B}{n} \cdot 100 = \frac{14}{20} \cdot 100 = 70 \rightarrow P_{70} = 40$$

Mar 22-10:05 AM

Find \bar{x} & S .

STAT → CALC

1: 1-Var Stats

$\bar{x} = 31$

$S = 11.585$

$n = 20$

Min = 18

$Q_1 = 20$

Med = 28

$Q_3 = 42$

Max = 52

with Menu

List: L1

FreqList: Clear

Calculate

No Menu

L1 Enter

Find S^2 in reduced fraction

VARs 5: Statistics 3: S_x

x^2 MATH 1: Frac Enter

2550

19

$\bar{x} = 31$

$S \approx 12$

68% Range $\rightarrow \bar{x} \pm S = 31 \pm 12 \Rightarrow 19$ to 43

16% 68% 16%
19 43

$100\% - 68\% = 32\%$

$32\% \div 2 = 16\%$

About 68% + 16% = 84% are above 19 Years old.

Find data element with Z-Score of 1.75.

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

$$1.75 = \frac{x - 31}{12} \rightarrow x - 31 = 21 \rightarrow x = 52$$

Mar 22-10:08 AM

Store the following in L1 & L2

L1	L2
14	8
20	12
26	20
32	6
38	4

1) clear all lists.
`[end] [+ 4:clear All lists] [Enter]`

2) `[STAT] [Edit] [1:Edit]`

L1	L2
14	8
20	12
26	20
32	6
38	4

3) `[STAT] [→] CALC`

`1:1-Var Stats` `[2nd] [1]`

With Menu: List: L1, FreqList: L2, `[Calculate]`

No Menu: L1, L2 `[enter]` `[2nd] [2]`

$\bar{x} = 24.32$
 $S = 6.754$
 $n = 50$

Find S^2 in reduced fraction.
`[VARS] [5:Statistics] [3: Sx] [χ^2] [Enter]`
 $S^2 = 45.60979592 \dots$
`[MATH] [1:→frac] [Enter]` $\frac{55872}{1225}$

Mar 22-10:27 AM

How to find \bar{x} & S for grouped data

class MP \rightarrow L1
class F \rightarrow L2

`[STAT] [→] CALC`
`1:1-Var Stats`

List: L1
FreqList: L2
`[Calculate]`

$\left. \begin{array}{l} \text{List: L1} \\ \text{FreqList: L2} \end{array} \right\} \begin{array}{l} \text{L1, L2} \\ \text{[enter]} \end{array}$

L1	L2
class MP	class F
18	5
30	8
42	12
54	5

$\bar{x} = 36.8$
 $S = 11.657$
 $n = 30$

$S^2 = \frac{19704}{145}$

Mar 22-10:39 AM

class MP	class F
15	3
25	7
35	12
45	18
55	10

Find

$\bar{x} = 40$

$S = 11.473$

$S^2 = \frac{6450}{49}$

VARs

5: Statistics

3: Sx

x^2

MATH

1: $\frac{\square}{\square}$

(Enter)

Mar 22-10:46 AM

In-Person QZ 4

Consider the Sample below

28	35	46	20
18	30	25	40
19	23	29	36
45	50	25	

Find

$\bar{x} = 31.26 \approx \boxed{31}$

$S = 10.306 \approx \boxed{10}$

$S^2 = \frac{11152}{105}$

} Round to whole #

} Reduced fraction

Mar 22-10:52 AM