

Statistics

Lecture 5



Feb 19-8:47 AM

Class Quiz 1

Consider the Sample below

1 3 3 3 9

1) Range = $9 - 1 = 8$ ✓ 2) Midrange = $\frac{9+1}{2} = 5$ ✓

3) Mode = 3 ✓ 4) $\sum x = 19$ ✓

$n = 5$

5) $\sum x^2 = 109$ ✓

$$\bar{x} = \frac{\sum x}{n} = \frac{19}{5} = 3.8$$

$$s^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 109 - 19^2}{5(5-1)} = \frac{184}{20} = 9.2$$

$$s = \sqrt{s^2} = \sqrt{9.2} \approx 3.033$$

Sep 9-2:28 PM

1) Clear all lists.

`2nd` `+` `4:Clear All Lists` `Enter`

2) Reset all lists.

`STAT` `Edit` `Enter`
`5:Setup Editor`

3) quit

`2nd` `MODE`

4) Clear Screen

`clear`

Sep 11-12:18 PM

I randomly selected 20 Voters, and here are their ages:

24	32	30	45	50
21	30	35	28	40
42	55	62	64	43
35	28	70	58	38

Store this data
set in L1

`STAT` `Edit`
`1>Edit`

	L1
	24
	32
<code>↑</code>	30
	⋮
<code>↑</code>	38

quit & clear Screen

`2nd` `MODE` `clear`

Sep 11-12:22 PM

View **L1**
2nd **L1** Enter

{ 24 32 30 45 . . . 70 58 38 }

→ → →
← ← ←

Now Sort **L1**, view it again, and make Stem Plot.

STAT Edit **2nd** **L1** Enter
 2:SortAC

2nd **L1** Enter

{ 21 24 28 28 } → → →

2	1488
3	002558
4	0235
5	058
6	24
7	0

Sep 11-12:28 PM

find \bar{x} & S.

STAT → **CALC**

$\bar{x} = 41.5$
$S = S_x = 14.189$

↓
 ↓ Min = 21
 ↓ $Q_1 = 30$
 ↓ Med. = 39
 ↓ $Q_3 = 52.5$
 ↓ Max = 70

} 5-Number Summary

1: 1-Var Stat
 With Menu List: L1
 Freq List: **clear**
Calculate

} NO Menu L1
Enter

} what about S^2 ?
VAR **5: Statistics**
3: Sx **χ^2** **Enter**

201.316
MATH **1: Σ S \square** **Enter**
 $\frac{3825}{19}$

Convert to a reduced fraction

Sep 11-12:34 PM

Clear all lists

2nd **+** **4: clear All lists** **Enter**

Store the following in L1

78	65	100	90	88
80	70	58	95	100
75	85	95	69	93
70	80	82	89	94
90	58	65	69	75

STAT **Edit**
1: Edit

L1

78
65
100
...
75

quit $\dot{=}$ clear screen

Sep 11-12:45 PM

Find \bar{x} & S

STAT **→** **CALC**
1: 1-Var Stats

menu
List: L1
FreqList: **Clear**
Calculate
find S^2

VAR **5: Statistics**
3: S_x **χ^2** **MATH**
1: ▸ Frac **Enter**

$\bar{x} = 80.52$
 $S = S_x = 12.741$

5-Number Summary
 Min = 58
 Q₁ = 69.5
 Med = 80
 Q₃ = 91.5
 Max = 100

No Menu
L1
Enter

$S^2 = \frac{48703}{300}$

Sep 11-12:50 PM

Class Quiz

Consider the Sample below

8	12	15	10
5	8	10	16
6	12	14	10

Find

$$\bar{x} = 10.5 = \boxed{11}$$

$$S = 3.451 = \boxed{3}$$

$$S^2 = \boxed{\frac{131}{11}}$$

} Round
to
whole #} Reduced
fraction

Sep 11-1:01 PM

A Sample has a symmetric data dist.

with $\bar{x} = 130$ and $S = 15$.

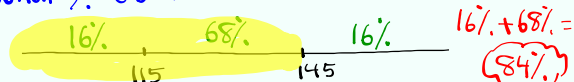
1) 68% Range

$$\bar{x} \pm S = 130 \pm 15 \Rightarrow \boxed{115 \text{ to } 145}$$

2) Usual Range
"95% Range"

$$\begin{aligned} \bar{x} \pm 2S &= 130 \pm 2(15) \\ &= 130 \pm 30 \Rightarrow \boxed{100 \text{ to } 160} \end{aligned}$$

3) What % of the data fall below 145?



4) What % of the data fall above 100?



$$95\% + 2.5\% = \boxed{97.5\%}$$

Sep 11-1:27 PM

I computed the following for randomly selected exams.

Min. 25, Max. 95 $\bar{x} = 80$ $S = 10$

Range = Max - Min
 $95 - 25 = 70$

Midrange = $\frac{\text{Max} + \text{Min}}{2}$
 $= \frac{95 + 25}{2} = 60$

Find Z-Score for exam score of 94.

$Z = \frac{x - \bar{x}}{S} = \frac{94 - 80}{10} = 1.4$ Usual Score
 $-2 \leq Z \leq 2$

Find exam score if Z-Score is -2.5.

$Z = \frac{x - \bar{x}}{S}$ $-2.5 = \frac{x - 80}{10}$

Cross-Multiply $x - 80 = 10(-2.5)$

$x = 80 - 25$ $x = 55$

$Z < -2$ or $Z > 2$ Unusual Score

Sep 11-1:36 PM

Clear all lists

L1	L2
24	3
34	7
44	10
54	5

→ $\bar{x} = 40.8$
 $S_x = 9.452$
 $n = 25$

Clear all lists

STAT → **CALC**

1:1-Var Stats

Menu	No Menu
List:L1	L1, L2
FreqList:L2	7
Calculate	Enter

Find s^2 in reduced frac.

VARS **5:Statistics**

3: Sx **x²**

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

$\frac{268}{3}$

Sep 11-1:44 PM

Store the following in L1

35 42 38 26 28

40 30 50 60 65

48 39 29 68 59

47 48 35 45 55

quit

Sort L1, view L1,

Make Stem Plot

{26 28 29 30...

```

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

Sep 11-1:53 PM

```

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

1) $n = 20$

2) Range = $68 - 26 = 42$

3) Estimate $S \approx \frac{\text{Range}}{4} = \frac{42}{4}$
 $= 10.5$

4) How many numbers are below 35? 4

5) What % of data elements are below 35?

$$\frac{4}{20} \cdot 100 = 20\%$$

Sep 11-1:59 PM

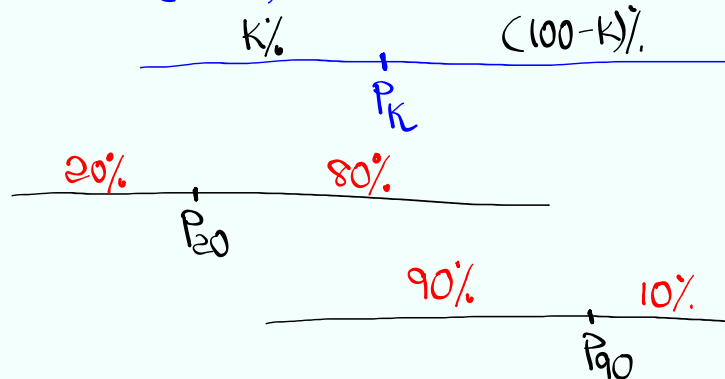
Percentile (Data must be Sorted)

Notation P_k

what does it mean?

$k\%$ fall below P_k

$(100-k)\%$ fall above P_k



Sep 11-2:02 PM

How to find P_k :

1) Location $L = \frac{k}{100} \cdot n$

if decimal \rightarrow Round-up

$$P_k = L\text{th element}$$

if whole $\rightarrow P_k = \frac{L\text{th element} + \text{Next element}}{2}$

Sep 11-2:05 PM

2	689
3	05589
4	025788
5	059
6	058

10% 90%

28.5

Find P_{10}

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

$$P_{10} = \frac{\text{end element} + \text{Next element}}{2}$$

$$= \frac{28 + 29}{2} = \boxed{28.5}$$

Find P_{72}

$$L = \frac{72}{100} \cdot 20 = 14.4$$

$$L = 15$$

$$P_{72} = 15\text{th element}$$

$$= \boxed{50}$$

72% 28%

50

Find P_{55}

$$L = \frac{55}{100} \cdot 20 = 11 \text{ whole \#}$$

$$P_{55} = \frac{11\text{th} + 12\text{th}}{2}$$

$$= \frac{45 + 47}{2} = 46$$

55% 45%

46

Sep 11-2:08 PM

2	689
3	05589
4	025788
5	059
6	058

Doing Reverse

$$P_k = 60$$

below 60

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

Sample Size

$$k = \frac{17}{20} \cdot 100 = 85$$

$$P_{85} = 60$$

Median = P

$$\boxed{50}$$

Sep 11-2:15 PM

Consider the stem Plot below:

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

1) $n = 30$

2) Find P_{20}

$L = \frac{20}{100} \cdot 30 = 6$

$P_{20} = \frac{6^{th} + 7^{th}}{2} = \frac{35 + 35}{2} = 35$

3) Find P_{82}

$L = \frac{82}{100} \cdot 30 = 24.6$ $L = 25$

$P_{82} = 25^{th} \text{ element} = 70$

4) Find K such that $P_K = 40$

$K = \frac{B}{n} \cdot 100 = \frac{8}{30} \cdot 100 = 26.6 \approx 27$

$P_{27} = 40$

Sep 11-2:18 PM

Complete the chart below

class limits	class MP	class F.	Cum. F.
22 - 30	26	4	4
31 - 39	35	7	11
40 - 48	44	14	25
49 - 57	53	10	35

$n = 35$

Clear All lists , class MP \rightarrow L1
class F \rightarrow L2

STAT \rightarrow **CALC**

1:1 - Var Stats

$\bar{x} = 42.714$
 $S = 8.770$
 $n = 35$

Menu
List: L1
FreqList: L2
Calculate

NO Menu
L1, L2 **Enter**
7

$S^2 = \frac{9153}{119}$

Sep 11-2:28 PM