

Statistics

Lecture 4



Feb 19-8:47 AM

Intro to percentile

SG 6-8

"Data must be Sorted"

Notation P_K $K\%$ $(100-K)\%$

ex: P_{15} 15% 85%

P_{80} 80% 20%

Sep 22-5:07 PM

How to find P_K

1) Data must be Sorted

2) Location $L = \frac{K}{100} \cdot n$ Sample Size

If L is decimal $\rightarrow$ Round-up to a whole #

$P_K = L^{\text{th}} \text{ element}$

If L is a whole #

$P_K = \frac{L^{\text{th}} \text{ element} + \text{Next element}}{2}$

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Consider the Stem Plot below

4|035
5|24558
6|02444689
7|23589
8|0024

1) $n = 25$

2) Range = $84 - 40 = 44$

3) Midrange = $\frac{84 + 40}{2} = 62$

4) Mode 64

5) Estimate S

$$S \approx \frac{\text{Range}}{4} = \frac{44}{4} = 11$$

8) Find P_{10}

$$L = \frac{10}{100} \cdot 25 = 2.5$$

Decimal

$$L = 3$$

$P_{10} = 3^{\text{rd}} \text{ element}$
 $= \boxed{45}$

10% 90%

$P_{10} = 45$

9) Find P_{50}

$$L = \frac{50}{100} \cdot 25 = 12.5$$

Median

$$L = 13$$

$P_{50} = 13^{\text{th}} \text{ element}$
 $= \boxed{64}$

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4 | 035
5 | 24558
6 | 02444689
7 | 23589
8 | 0024

10) P_{80}

$L = \frac{80}{100} \cdot 25 = 20$ (whole #)

$P_{80} = \frac{20\text{th element} + \text{Next element}}{2}$

$P_{80} = \frac{78 + 79}{2} = 78.5$

80% 20%

Doing Reverse Find K Such that

$P_K = 60$

$K = \frac{B}{n} \cdot 100$, Round to whole %

$K = \frac{8}{25} \cdot 100 = 32$

32% 68%

$P_{32} = 60$

Sep 22-5:22 PM

4 | 035
5 | 24558
6 | 02444689
7 | 23589
8 | 0024

Find percentile ranking of 80.

Find K Such that $P_K = 80$

$K = \frac{B}{n} \cdot 100 = \frac{21}{25} \cdot 100 = 84$

$P_{84} = 80$

84% 16%

$P_{84} = 80$

Sep 22-5:28 PM

Intro to TI Calc. :

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** **Enter**
5:Setup Editor

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How to store data elements in a list:

Consider the Sample below

15 12 20 18 13
25 28 10 32 28

STAT **Edit**
1:Edit

L1
15
12
20
28

Let's quit & clear Screen

2nd **MODE** **Clear**

How to view L1:

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

{ 15 12 20 18 - - - 28 }

← **←** **←** **→** **→** **→**

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How to Sort a list:

[STAT] Edit [2nd] [1] [Enter]
 [2:SortA(] L1

Let's view L1

[2nd] [1] [Enter]
 L1

1 | 02358
 2 | 0588
 3 | 2

{ 10 12 13 15 - - - 32 }

Sep 22-5:46 PM

How to Find $\bar{x}$ and S:

[STAT] → CALC [2nd] [1]
 [1:1-Var Stats] No Menu
 with Menu 1-Var Stats
 List: L1 L1 [Enter]
 FreqList: [clear]
 [Calculate]

Min = 10

$\bar{x} = 20.1$

Q₁ = 13

S = S_x = 7.738

Med = 19

↓ n = 10

Q₃ = 28

↓

Max = 32

↓

Sep 22-5:53 PM

How to find S^2 :

[VARs] **[5: Statistics]** **[3: S_x]** **[x^2]** **[Enter]**

$$S^2 = 59.8\overline{7}$$

To convert this into a reduced fraction

[MATH] **[1: $\rightarrow$ Frac]** **[Enter]**

$$S^2 = \frac{5389}{90}$$

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Clear all lists

[2nd] **[+]** **[4: Clear All Lists]** **[Enter]**

I randomly selected 20 exams and here are the Scores:

$n=20$

78 90 100 65 80

store in L1

82 75 70 68 95

[STAT] **[Edit]**

52 63 77 58 100

[1: Edit]

90 88 86 76 78

L1
78 **[Enter]**
90 "
:
78 "

quit & clear Screen

[2nd] **[MODE]** **[clear]**

Sep 22-6:05 PM

Sort L1, View L1, make Stem Plot

[STAT] Edit

[2nd] [1] [Enter]

[2:SortA]

[2nd] [1] [Enter]

{52 58 63 ...}

→ → →
← ← ←

5 | 28
6 | 358
7 | 056788
8 | 0268
9 | 005
10 | 00

Sep 22-6:13 PM

find $\bar{x}$ and S:

[STAT] → [CALC]

[1:1-Var Stats]

with Menu

List: L1

FreqList: [Clear]

[Calculate]

Min = 52

$Q_1 = 69$

Med = 78

$Q_3 = 89$

Max = 100

$\bar{x} = 78.55$

$S = S_x = 13.320$

$n = 20$

↓

↓

↓

[2nd] [1]

No Menu

1-Var Stats

L1 [Enter]

Find $S^2 = \frac{67419}{380}$
in reduced
fraction

[VARS] [5:Statistics]

[3:Sx] [x^2] [Math]

[1:→Frac] [Enter]

Sep 22-6:19 PM

$$\text{Min} = 52$$

$$Q_1 = 69$$

$$\text{Med} = 78$$

$$Q_3 = 89$$

$$\text{IQR} = Q_3 - Q_1 = 20$$

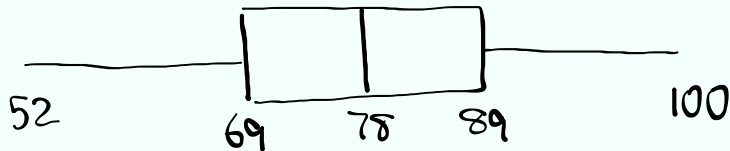
$$\text{Max} = 100$$

$$\begin{aligned} \text{Upper Fence} &= Q_3 + 1.5(\text{IQR}) \\ &= 89 + 1.5(20) = \boxed{119} \end{aligned}$$

$$\begin{aligned} \text{Lower Fence} &= Q_1 - 1.5(\text{IQR}) \\ &= 69 - 1.5(20) = \boxed{39} \end{aligned}$$

No outliers

Box Plot



Sep 22-6:28 PM

How to find $\bar{x}$ & s of a freq. table:

Grouped data

store class MP $\rightarrow$ L1

class F $\rightarrow$ L2

class MP	class F
17	4
25	10
32	6

clear all lists

[2nd] [4] 4:clearAllLists [enter]

[STAT] Edit

[1] 1:Edit

L1	L2
17	4
25	10
32	6

[STAT] [2] CALC

[1] 1:1-Var Stats

$$\bar{x} = 25.5$$

$$s = 5.356$$

$$n = 20$$

$$s^2 = \frac{545}{19}$$

with Menu

List: L1

Freq List: L2

[Calculate]

No Menu

1-Var Stats

L1, L2

[7]

[end] [1]

[end] [2]

clear all lists

clear the Screen

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Complete the chart below

class limits	class MP	class F
16 - 28	22	4
29 - 41	35	8
42 - 54	48	12
55 - 67	61	6

1) How many classes? 4

2) class width 13

3) Sample Size

$$n = \sum f = 30$$

class MP $\rightarrow$ L1, class F $\rightarrow$ L2

STAT $\rightarrow$ CALC

1: 1-Var Stats

No Menu

$$\bar{x} = 43.667$$

List: L1

L1, L2

$$Sx = 12.466$$

Freq List: L2

$$n = 30$$

Calculate

Enter

Find S^2 in reduced fraction

$$S^2 = \frac{13520}{87}$$

Sep 22-6:43 PM

$$\bar{x} = 43.667$$

$$\bar{x} \approx 44 \quad S \approx 12$$

$$Sx = 12.466$$

68% Range

$$\bar{x} \pm S =$$

$$n = 30$$

$$44 \pm 12 = \boxed{32 \text{ to } 56}$$

usual Range

$$\bar{x} \pm 2S = 44 \pm 2(12) = \boxed{20 \text{ to } 68}$$

95% Range

Find Z-Score for data element 62.

$$Z = \frac{x - \bar{x}}{S} = \frac{62 - 44}{12} = \frac{18}{12} = \boxed{1.5} \text{ usual}$$

$$-2 \leq Z \leq 2$$

Find data element with Z-Score of -2.5.

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

$$-2.5 = \frac{x - 44}{12}$$

Cross-Multiply

$$\rightarrow x - 44 = 12(-2.5)$$

$$x = 44 - 30$$

$$\boxed{x = 14} \text{ unusual}$$

$$Z < -2$$

Sep 22-6:56 PM