Statistics
Spring 2023
Lecture 10

Feb 19-8:47 AM

Clear all lists 2nd + 4:clear all lists Enter

Store the following in L1 STAT Edit 1:Edit

68	75	70	55	80
90	73	70	95	82
100	95	58	60	69
74	88	98	90	80

2nd 1 Enter → Now View L1 ε:

5 | 5 8
6 | 0 8 9
7 | 0 0 3 4 5
8 | 0 0 2 8
9 | 0 0 5 5 8
10 | 0

Now Sort L1

From Smallest to largest 2nd 1

STAT Edit 2:SortA(L1 Enter

make STEM Plot

2nd 1 Enter

Range = 100 − 55 = 45

Midrange = $\frac{100+55}{2}$ = 72.5

Estimate $s \approx \frac{\text{Range}}{4} = \frac{45}{4} = 11.25$

What % of data elements are below 70?

$\frac{5}{20} \cdot 100 = 25\%$

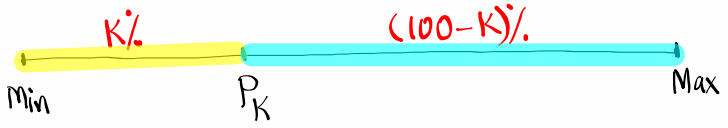
What % of data elements are below 80?

$\frac{10}{20} \cdot 100 = 50\%$

Feb 21-8:26 AM

Percentile ⟷ Data must be Sorted

P_K is the value that K% fall below it and (100 - K)% fall above it.



P_{20}

P_{90}

Feb 22-7:27 AM

How to Find P_K

Make Sure the data is Sorted.

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

If L is decimal ⇒ Round-up to a whole # that is the location of P_K

If L is a whole # ⇒ P_K = (Lth element + Next one) / 2

4	3 5 8
5	0 3 6 6 6 9
6	2 5 5 5 7 8 8 9
7	0 3 5 6 8 8 9
8	2 6 8 9
9	0 4 6
10	0

n = 32

Find P_{20}

$L = \frac{20}{100} \cdot 32 = 6.4$

L = 7

P_{20} = 7th element

$P_{20} = 56$

Find P_{50}

$L = \frac{50}{100} \cdot 32$

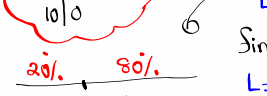
L = 16

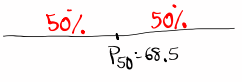
P_{50} = (16th element + Next one) / 2

$= \frac{68 + 69}{2} = 68.5$

$P_{50} = 68.5$

Median





Feb 22-7:31 AM

Now doing reverse

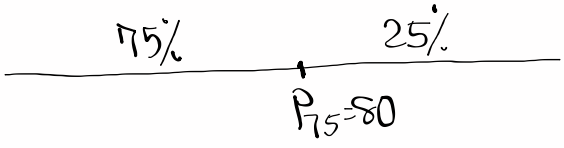
Find K such that $P_K = 80$

Below

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

Sample Size

$K = \frac{24}{32} \cdot 100 = 75 \Rightarrow P_{75} = 80$



Feb 22-7:42 AM

I randomly selected 40 students, and here are their ages:

24	32	18	20	20
28	30	19	19	25
25	29	21	30	35
35	38	55	42	48
50	52	40	46	46
38	24	24	20	20
19	27	37	47	53
59	60	20	15	30

Store this data in L1

Sort & View L1

Make STEM Plot

1	58999
2	00000144455789
3	000255788
4	026678
5	02359
6	0

Feb 22-7:46 AM

1	58999
2	0000014445789
3	0002557 88
4	026678
5	02359
6	0

Find P_{30}

$L = \frac{30}{100} \cdot 40 = 12$

$P_{30} = \frac{12\text{th element} + \text{Next one}}{2}$

$= \frac{24+24}{2} = 24$

30% | 70%

$P_{30} = 24$

Find P_{85}

$L = \frac{85}{100} \cdot 40 = 34$

$P_{85} = \frac{34\text{th element} + \text{Next one}}{2}$

$= \frac{48+50}{2} = 49$

85% | 15%

$P_{85} = 49$

Find P_{68}

$L = \frac{68}{100} \cdot 40 = 27.2$

$L = 28$

2nd [1] [(] 28 [)] Enter

$P_{68} = 28\text{th element}$

$= 38$

68% | 32%

$P_{68} = 38$

Feb 22-7:56 AM

1	58999
2	0000014445789
3	0002557 88
4	026678
5	02359
6	0

Below 50

Find K Such that

$P_K = 35$

$K = \frac{B}{n} \cdot 100$ (B: Below; n: Sample Size)

Round to whole %.

$K = \frac{23}{40} \cdot 100 = 57.5 \approx 58$

58% | 42%

35

$P_{58} = 35$

Find K Such that $P_K = 50$

$K = \frac{B}{n} \cdot 100$ (B: Below)

$= \frac{34}{40} \cdot 100 = 85$

85% | 15%

50

$P_{85} = 50$

SG 5-8 ✓✓

Feb 22-8:04 AM

Consider the chart below

class MP	Class F
58	3
70	7
82	12
94	8
106	5

(+12 between each pair of class MPs)

1) How many classes?
5 classes

2) class width?
12

3) Sample Size?
$n = \sum F = 3+7+12+8+5 = 35$

4) Find $\bar{x}$, S, and n.
Working with grouped data
Class MP → L1
Class F → L2
⇒ STAT CALC 1:1-Var Stats
Use L1 & L2

$\bar{x} = 83.714$
$S = S_x = 14.001$
$n = 35$

5) Find S^2 in reduced fraction
VARS 5: 3: x^2 MATH 1: Enter

$S^2 = \frac{23328}{119}$

Feb 22-8:12 AM

Round $\bar{x}$ & S to a whole #, then find

$\bar{x} \approx 84$, $S \approx 14$

1) 68% Range
$\bar{x} \pm S = 84 \pm 14 =$ 70 to 98

2) Usual Range
95% Range
$\bar{x} \pm 2S = 84 \pm 2(14) =$ 56 to 112

3) 99.7% Range
$\bar{x} \pm 3S = 84 \pm 3(14) =$ 42 to 126

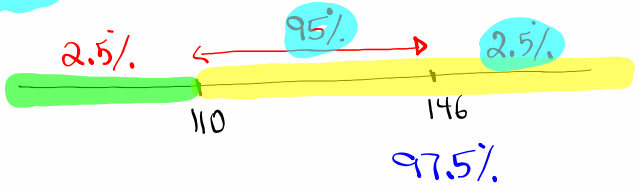
Feb 22-8:22 AM

A Sample with 300 data elements had a mean of 128 and standard dev. of 9. Assume data dist. was symmetric.

1) Usual Range

95% Range $\Rightarrow \bar{x} \pm 2s = 128 \pm 2(9) \Rightarrow$ 110 to 146

2) What % of data elements are above 110?



97.5%

3) How many of data elements are below 110?

2.5% of 300 = 2.5(.01)(300) = 7.5

$\approx$ 8 About 8

Feb 22-8:26 AM