

Statistics

Lecture 2



Feb 19-8:47 AM

Consider the Sample below

(S.G. 3-4)

2, 4, 5, 5, 8

1) Sample Size $n=5$

2) Range = Max - Min = $8 - 2 = 6$

3) Midrange = $\frac{\text{Max} + \text{Min}}{2} = \frac{8 + 2}{2} = \frac{10}{2} = 5$

4) Mode = 5

5) Find $\frac{\text{Range}}{3}$, if decimal \rightarrow Round-up
if whole \rightarrow Add 1

$$\frac{6}{3} = 2$$

3

6) Find $\frac{\text{Range}}{4}$, if decimal \rightarrow Round-up
if whole \rightarrow Add 1

$$\frac{6}{4} = 1.5$$

2

Data element

$$7) \sum x = 2 + 4 + 5 + 5 + 8 = [24]$$

Summation

$$8) \sum x^2 = 2^2 + 4^2 + 5^2 + 5^2 + 8^2 = 4 + 16 + 25 + 25 + 64 = [134]$$

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9) Find $\frac{\sum x}{n} = \frac{24}{5} = \boxed{4.8}$

10) Find $\frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 134 - 24^2}{5(5-1)}$
 $= \frac{94}{20} = \boxed{4.7}$

11) Find $\sqrt{\text{Last Ans}} = \sqrt{4.7} \approx \boxed{2.168}$

Round to

whole $\rightarrow 2$

1-Dec. $\rightarrow 2.2$

2-Dec. $\rightarrow 2.17$

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Making a frequency table

one way to organize data

Class limits	Class BNDRS	Class MP	Class F	Cum. F	Rel. F	%F

To make a table, we need # of classes,
and compute class width.

Range

of classes

If decimal \rightarrow Round-up
to whole #

If whole \rightarrow Add 1

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I randomly selected 20 students, here are their ages.

18	19	20	20	24
25	28	29	30	30
30	32	35	36	40
42	42	46	50	52

1) $n = 20$
 2) $\text{Max} = 52, \text{Min} = 18$
 3) $\text{Range} = \text{Max} - \text{Min} = 52 - 18 = 34$
 4) $\text{Midrange} = \frac{\text{Max} + \text{Min}}{2} = \frac{52 + 18}{2} = 35$
 5) $\text{mode} = 30$

Let's make a freg. table with 3 classes.

$\frac{\text{Range}}{3} = \frac{34}{3} = 11.\bar{3}$ ← Round-up since it is decimal.
 $\boxed{CW = 12}$

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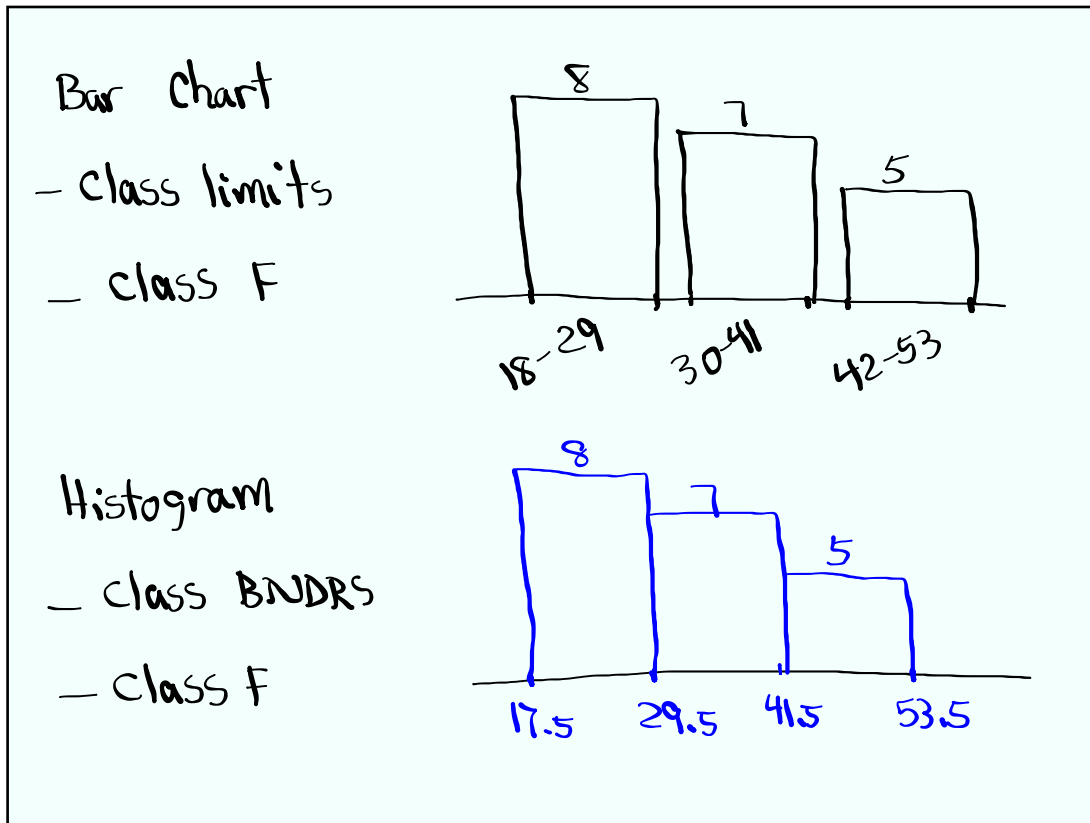
Class limits	Class BNDRS	Class MP	Class F	Cum. F	Rel. F	% F
18 - 29	17.5 - 29.5	23.5	8	8	.40	40%
30 - 41	29.5 - 41.5	35.5	7	15	.35	35%
42 - 53	41.5 - 53.5	47.5	5	20	.25	25%

n →

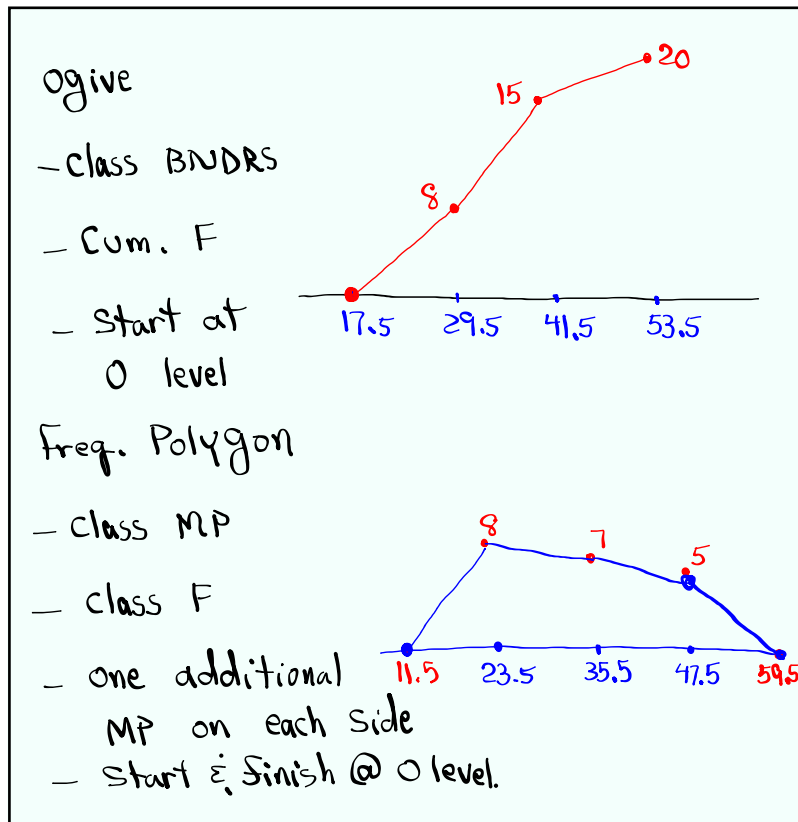
$\text{class MP} = \frac{\text{+ class limits}}{2}$

$\text{Rel. F} = \frac{f}{n} = \frac{f}{20}$

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Sep 6-8:43 AM



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Pie chart

- Circle
- use class limits to name each slice
- Use % for size of each slice

STEM Plot
(Data must be Sorted)

18	19	20	20	24	1	89
25	28	29	30	30	2	004589
30	32	35	36	40	3	000256
42	42	46	50	52	4	0226
					5	02

what % of students were at least 30 years old? $35\% + 25\% = \boxed{60\%}$

what % of students were at most 41 years old? $35\% + 40\% = \boxed{75\%}$

Sep 6-8:52 AM

I randomly selected 25 exams, and here are the scores:

52	55	59	63	65
68	69	70	72	75
75	75	78	80	84
86	86	86	88	90
92	95	98	100	100

- $n = 25$
- Range = $100 - 52 = 48$
- Midrange = $\frac{100 + 52}{2} = 76$
- Mode = 75 & 86

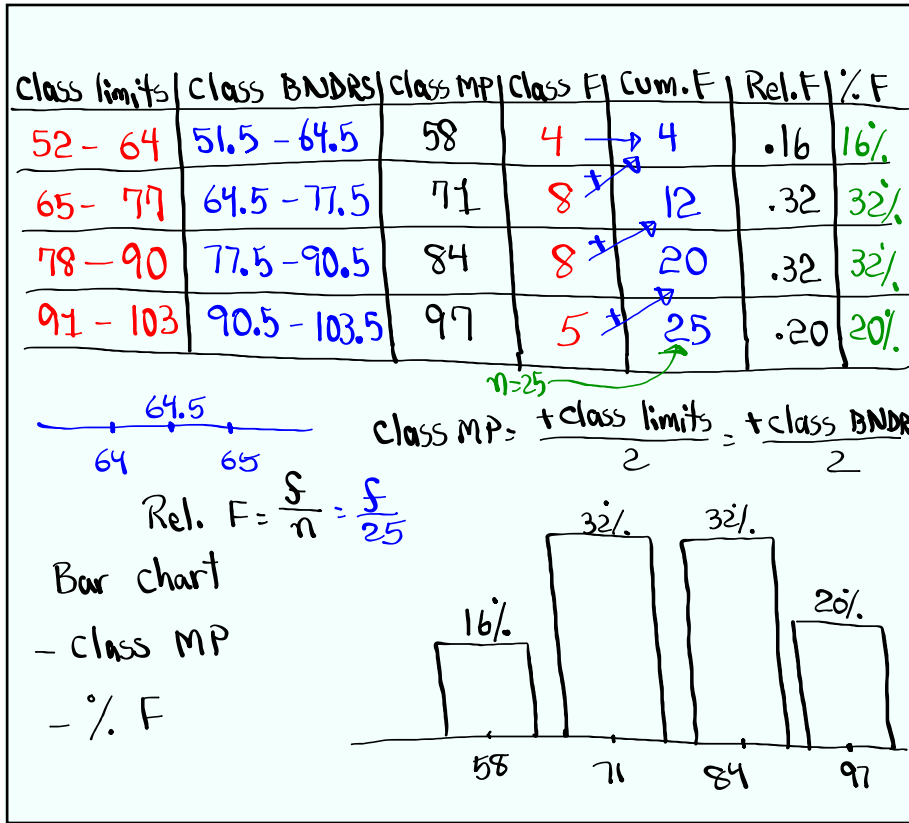
5) Find class width if we wish to have a freq. table with 4 classes.

$$\frac{\text{Range}}{\# \text{ classes}} = \frac{48}{4} = 12$$

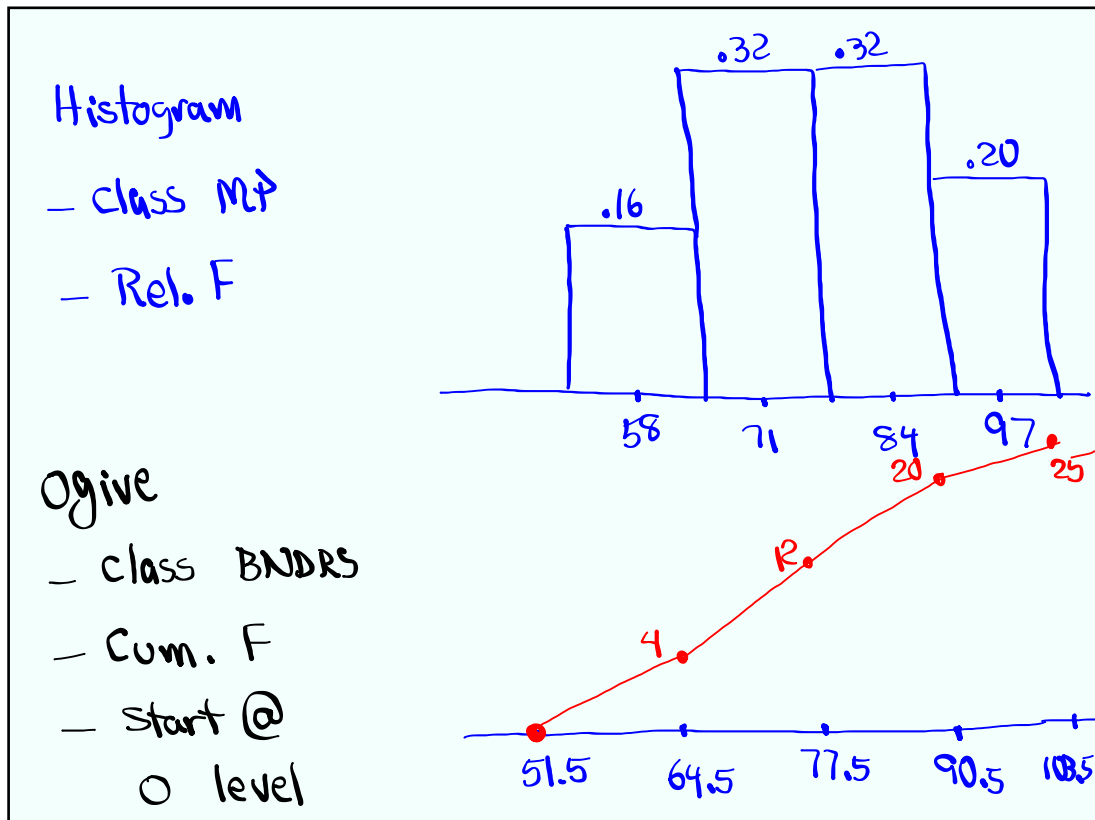
↑
Whole #

CW = 13

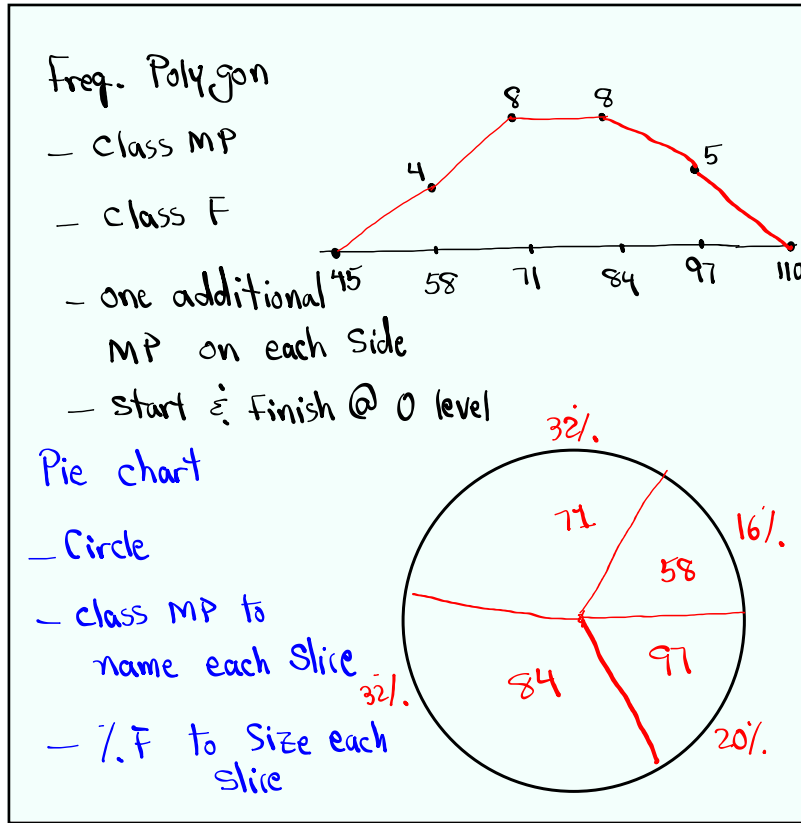
Sep 6-9:19 AM



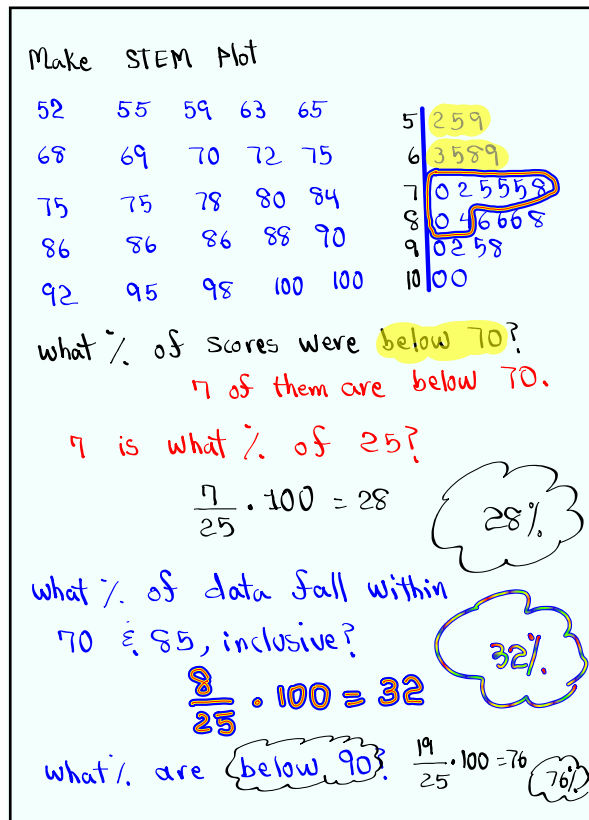
Sep 6-9:26 AM



Sep 6-9:39 AM



Sep 6-9:44 AM



Sep 6-9:50 AM

$x \rightarrow$ Data element

(SG 5-8)

$\sum x \rightarrow$ Sum all data elements

$n \rightarrow$ Sample Size

$\bar{x} \rightarrow$ x -bar \rightarrow Sample Mean (Average)

$$\bar{x} = \frac{\sum x}{n}$$

Sep 6-10:13 AM

Consider the Sample below

1 3 5 6 9 1) $n = 5$

2) Range = $9 - 1 = 8$

5) $\sum x = 1 + 3 + 5 + 6 + 9$
 $= \boxed{24}$

3) Midrange = $\frac{9+1}{2} = 5$

4) Mode = None

6) $\bar{x} = \frac{\sum x}{n} = \frac{24}{5} = \boxed{4.8}$

Sep 6-10:16 AM

Consider the Sample below

0 2 4 4 1) $n = 8$

6 6 8 10 2) Range = 10

3) Midrange = 5

4) Mode 4 & 6
Bimodal

5) $\sum x = 40$

6) $\bar{x} = \frac{\sum x}{n} = \frac{40}{8} = 5$

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$x \rightarrow$ data element

$n \rightarrow$ Sample Size

$\bar{x} \rightarrow$ Sample Mean

$\sum x \rightarrow$ Sum of data elements

$\sum x^2 \rightarrow$ Square data elements, then add

$S^2 \rightarrow$ Sample Variance

$$\bar{x} = \frac{\sum x}{n}$$

$$S^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$$

$$S^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n - 1)}$$

Sep 6-10:23 AM

Consider the Sample below

1 2 2 2 3

$$n=5$$

$$\sum x = 1 + 2 + 2 + 2 + 3 = 10$$

$$\sum x^2 = 1^2 + 2^2 + 2^2 + 2^2 + 3^2 = 22$$

$$\bar{x} = \frac{\sum x}{n} = \frac{10}{5} = 2$$

$$s^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 22 - 10^2}{5(5-1)} = \frac{10}{20} = .5$$

Sep 6-10:27 AM

Consider the Sample below

1 2 2 2

3 3 3 4

$$1) n = 8$$

$$4) \bar{x} = \frac{\sum x}{n} = \frac{20}{8} = \boxed{2.5}$$

$$2) \sum x = 20$$

$$5) s^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)}$$

$$3) \sum x^2 = 56$$

$$= \frac{8 \cdot 56 - 20^2}{8(8-1)} = \frac{48}{56}$$

$$\approx \boxed{.857}$$

Sep 6-10:31 AM

\bar{x} → Sample Mean

S^2 → Sample Variance

S → Sample Standard deviation

$$\bar{x} = \frac{\sum x}{n}$$

$$S^2 = \frac{\sum (x - \bar{x})^2}{n - 1}$$

$$S^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)}$$

$$S = \sqrt{S^2}$$

Sep 6-10:36 AM

Given $n=6$, $\sum x=46$, $\sum x^2=370$

1) \bar{x} , Round to a whole #.

$$\bar{x} = \frac{\sum x}{n} = \frac{46}{6} = 7.\bar{6} \approx \boxed{8}$$

2) S^2 , Round to 1-decimal

$$S^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{6 \cdot 370 - 46^2}{6(6-1)} = \frac{104}{30} = 3.\bar{46} \approx \boxed{3.5}$$

3) S , Round to a whole #.

$$S = \sqrt{S^2} = \sqrt{3.5} \approx 1.871 \approx \boxed{2}$$

Sep 6-10:39 AM

Given $n=10$, $\sum x=100$, $\sum x^2=1000$

$$1) \bar{x} = \frac{\sum x}{n} = \frac{100}{10} = \boxed{10}$$

$$2) S^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{10 \cdot 1000 - 100^2}{10(10-1)} = \frac{0}{90} = \boxed{0}$$

$$3) S = \sqrt{S^2} = \sqrt{0} = \boxed{0}$$

Sep 6-10:45 AM

Class Quiz 1:

Consider the Sample below

3 5 5 8 12 15

$$1) \text{Range} = 15 - 3 = \boxed{12}$$

$$2) \text{Midrange} = \frac{15+3}{2} = \boxed{9}$$

$$3) \text{Mode} = \boxed{5}$$

$$4) \text{Sample Size} = \boxed{n=6}$$

Sep 6-10:50 AM