Statistics

Lecture 3

Feb 19-8:47 AM

A data set has a min. of 25 and max of 95.

1) Range = Max − Min = 95 − 25 = 70

2) Midrange = $\frac{\text{Max} + \text{Min}}{2} = \frac{95+25}{2} = \frac{120}{2} = 60$

3) find class width to build freq. table with

a) 4 classes $CW = \frac{\text{Range}}{\#\text{ of classes}} = \frac{70}{4} = 17.5$

Since it is decimal ⇒ we round up

CW = 18

b) 5 classes $CW = \frac{\text{Range}}{\#\text{ classes}} = \frac{70}{5} = 14$

Since it is a whole # ⇒ we add 1

CW = 15

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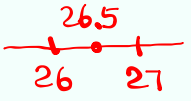
Complete the chart below:

class limits	class BNDRS	class MP	class F	Cum. F	Rel. F	% F
18 – 26	17.5 – 26.5	22	4	4	.133	13.3%
27 – 35	26.5 – 35.5	31	8	12	.267	26.7%
36 – 44	35.5 – 44.5	40	13	25	.433	43.3%
45 – 53	44.5 – 53.5	49	5	30	.167	16.7%

4 classes, CW = 27 − 18 = 9, 

Class MP = $\frac{\text{+class limits}}{2} = \frac{\text{+class BNDRS}}{2}$, n = 30

Rel. F = $\frac{f}{n} = \frac{f}{30}$

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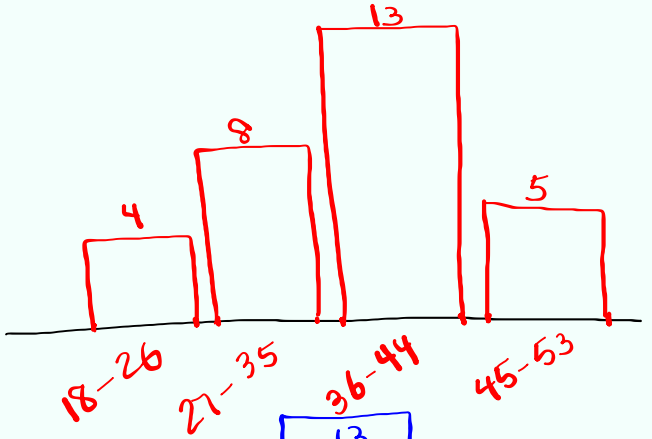
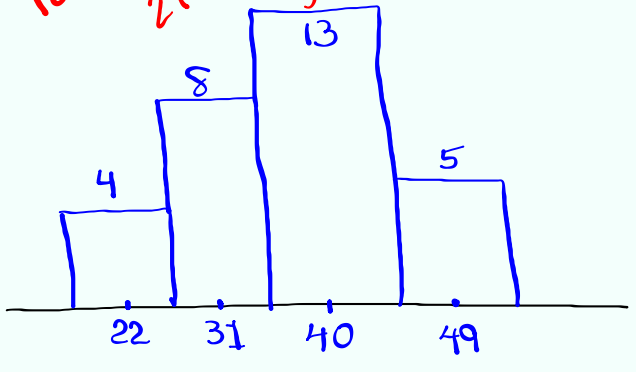
Draw Bar chart

- class limits
- class F.



Draw Histogram

- class MP
- class F



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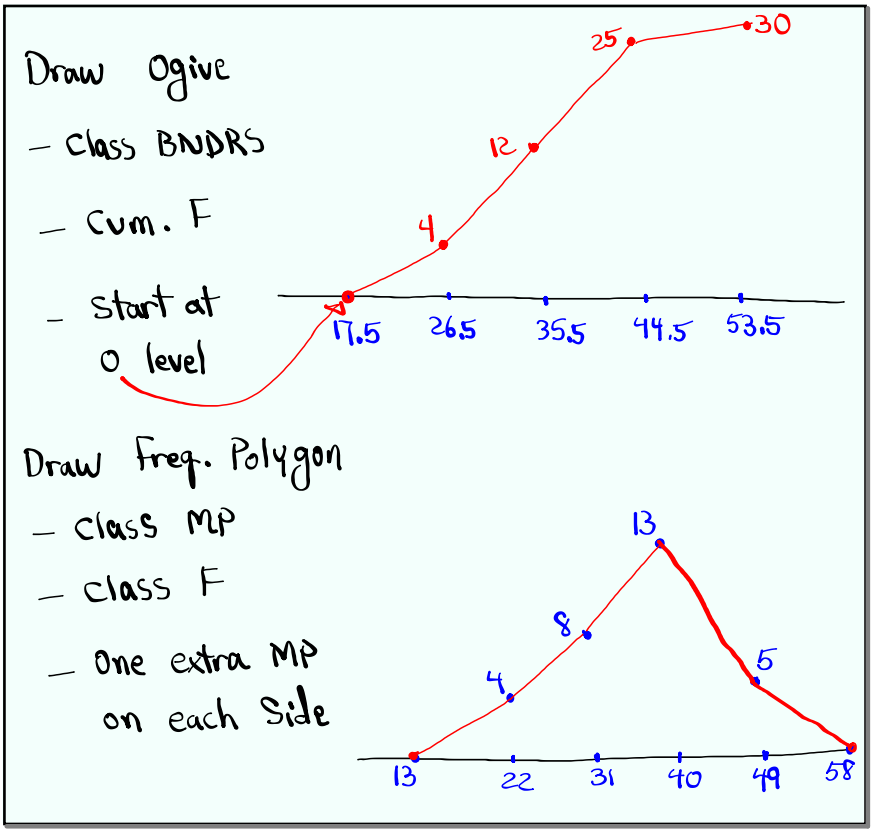

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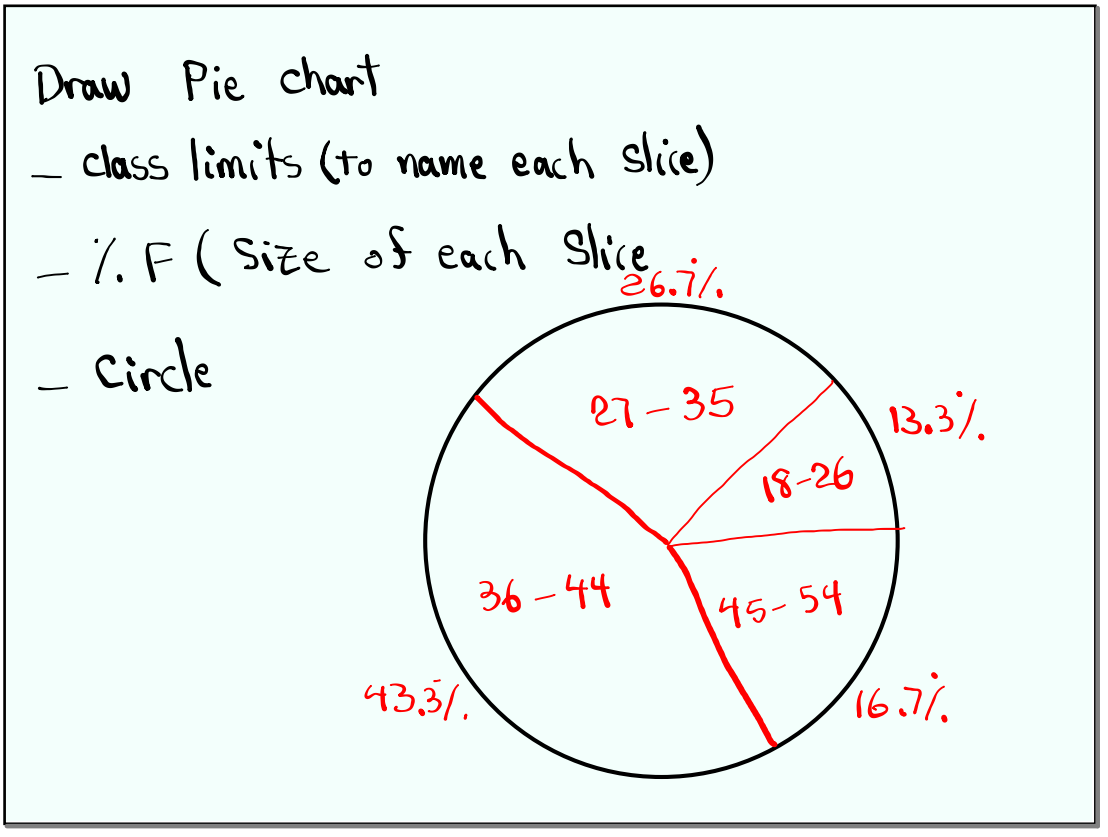

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I randomly selected 32 exams and here are the Scores:

48	52	58	58	60
65	68	68	69	70
70	73	75	75	75
78	78	79	82	83
85	85	85	87	89
90	92	93	96	96
98	100			

1) $n = 32$

2) Min. = 48 , Max. = 100

3) Range = Max − Min = 52

4) Midrange = $\frac{\text{Max} + \text{Min}}{2}$ = 74

5) Mode 75 & 85 Bimodal

6) Find class width if we wish to have

a) 3 classes: $CW = \frac{\text{Range}}{3} = \frac{52}{3} = 17.\overline{3}$ → CW = 18

b) 4 classes: $CW = \frac{\text{Range}}{4} = \frac{52}{4} = 13$ → CW = 14

c) 5 classes: $CW = \frac{\text{Range}}{5} = \frac{52}{5} = 10.4$ → CW = 11

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48	52	58	58	60
65	68	68	69	70
70	73	75	75	75
78	78	79	82	83
85	85	85	87	89
90	92	93	96	96
98	100			

Make STEM Plot Data must be Sorted.

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

How many Scores are below 70?

9

What % of Scores are below 70?

$\frac{9}{32} \cdot 100 = 28.125 \approx 28\%$

Round-up to a whole % ⇒ 29%

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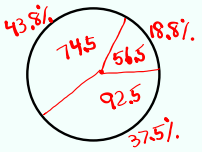
Make a freq. table with 3 classes.

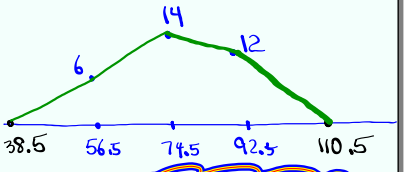
$CW = \frac{Range}{3} = \frac{52}{3} = 17.\overline{3} \rightarrow \boxed{CW = 18}$ $\frac{f}{n} = \frac{f}{32}$

class limits	class BNDRS	class MP	class F	Cum. F	Rel. F	%F
48 – 65	47.5 – 65.5	56.5	6	6	.188	18.8%
66 – 83	65.5 – 83.5	74.5	14	20	.438	43.8%
84 – 101	83.5 – 101.5	92.5	12	32	.375	37.5%

Pie Chart
- class MP
- % F



Freq. Polygon
- class MP
- one extra MP on each side
- class F
- Start & End @ 0 level.



SG 3 & 4

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$x \rightarrow$ Data element

$\sum x \rightarrow$ Sum of data elements

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

$n \rightarrow$ Sample Size

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

Consider the Sample below

2 3 4 4 6

1) $n = 5$ 2) Mode = 4 3) Range = 6 − 2 = 4

4) Midrange = $\frac{6+2}{2} = \frac{8}{2} = 4$

5) $\sum x = 2 + 3 + 4 + 4 + 6 = 19$

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

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$x \rightarrow$ Data element

$\sum x \rightarrow$ Sum of data elements

$\sum x^2 \rightarrow$ Square every data element, then find the Sum

$n \rightarrow$ Sample Size

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

$s^2 \rightarrow$ Sample Variance

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

Consider the Sample below

2 4 4 6 6

$n = 5$ $\quad \sum x = 2+4+4+6+6 = 22$ $\quad \bar{x} = \frac{\sum x}{n} = \frac{22}{5} = 4.4$

$\sum x^2 = 2^2+4^2+4^2+6^2+6^2 = 108$

$$s^2 = \frac{n\sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 108 - 22^2}{5(5-1)} = \frac{540-484}{5 \cdot 4} = \frac{56}{20} = 2.8$$

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$x \rightarrow$ Data element

$n \rightarrow$ Sample Size

$\bar{x} \rightarrow$ Sample Mean

$s^2 \rightarrow$ Sample Variance

$s \rightarrow$ Sample Standard deviation

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

From last example $s^2 = 2.8$

$$s = \sqrt{s^2} = \sqrt{2.8} \approx 1.673$$

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Consider the Sample below

1 3 3 3 6 6 6 9

1) $n = 8$ 2) Range $= 9 - 1 = 8$

3) Midrange $= \frac{9+1}{2} = 5$ 4) Mode $= 3$ & 6

5) $\Sigma x = 1+3+3+3+6+6+6+9 = 37$ 6) $\Sigma x^2 = 1^2+3^2+3^2+3^2+6^2+6^2+6^2+9^2 = 217$

7) $\bar{x} = \frac{\Sigma x}{n} = \frac{37}{8} = 4.625$

8) $s^2 = \frac{n\Sigma x^2 - (\Sigma x)^2}{n(n-1)} = \frac{8 \cdot 217 - 37^2}{8(8-1)} = \frac{1736-1369}{8 \cdot 7} = \frac{367}{56} \approx 6.554$

9) $s = \sqrt{s^2} = \sqrt{6.554} \approx 2.560$

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Given $n = 10$ $\Sigma x = 70$ $\Sigma x^2 = 490$

1) $\bar{x} = \frac{\Sigma x}{n} = \frac{70}{10} = 7$

2) $s^2 = \frac{n\Sigma x^2 - (\Sigma x)^2}{n(n-1)} = \frac{10 \cdot 490 - 70^2}{10(10-1)} = \frac{4900 - 4900}{10 \cdot 9} = \frac{0}{90} = 0$

3) $s = \sqrt{s^2} = \sqrt{0} = 0$

Do not write Ø for Zero.

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