

Statistics Lecture 2



Feb 19-8:47 AM

Consider the Sample below SG 3-4

3 5 8 9 11

1) Sample Size $n=5$

2) Range: $\text{Max} - \text{Min} = 11 - 3 = 8$

3) Midrange: $\frac{\text{Max} + \text{Min}}{2} = \frac{11+3}{2} = \frac{14}{2} = 7$

4) Mode None

5) Find $\frac{\text{Range}}{3}$ if decimal \rightarrow Round-up to a whole #

$\frac{8}{3} = 2.\bar{6}$ if whole \rightarrow Add 1

decimal \rightarrow 3

6) Find $\frac{\text{Range}}{4}$ if decimal \rightarrow Round-up to a whole

$\frac{8}{4} = 2$ whole 3 if whole \rightarrow Add 1

Sep 6-11:31 AM

7) $\sum x = 3 + 5 + 8 + 9 + 11 = \boxed{36}$
 \uparrow
 Summation

8) $\sum x^2 = 3^2 + 5^2 + 8^2 + 9^2 + 11^2 = \boxed{300}$

9) Find $\frac{\sum x}{n}$, Round to a whole #
 $= \frac{36}{5} = 7.2 \approx \boxed{7}$

10) Find $\frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 300 - 36^2}{5(5-1)}$
 $= \frac{204}{20} = \boxed{10.2}$

11) Find $\sqrt{\text{last answer}} = \sqrt{10.2} \approx 3.194$
 Round to
 whole $\rightarrow 3$
 1-dec. $\rightarrow 3.2$
 2-dec. $\rightarrow 3.19$

Sep 6-11:38 AM

Making a Freq. Table
 one way to organize the data

Class limits	Class B.N.D.R.S	Class M.P.	Class F	Com. F	Rel. F	% F

To make the Freq. table, we need to have # of classes.

to make the classes,

Range
classes

If decimal \rightarrow Round-up to a whole #
 If whole # \rightarrow Add 1

Class width
CW

Sep 6-11:47 AM

I randomly selected 20 nurses, here are their ages

24 26 27 30 32

35 35 35 38 40

42 43 43 43 48

49 50 51 53 54

4) Mode 35 & 43

1) Sample Size $n=20$

2) Range = $54 - 24 = 30$

3) Midrange = $\frac{54 + 24}{2} = 39$

5) Find class width for a freq. table


with 3 classes. whole #

$$\frac{\text{Range}}{3} = \frac{30}{3} = 10$$

CW 11

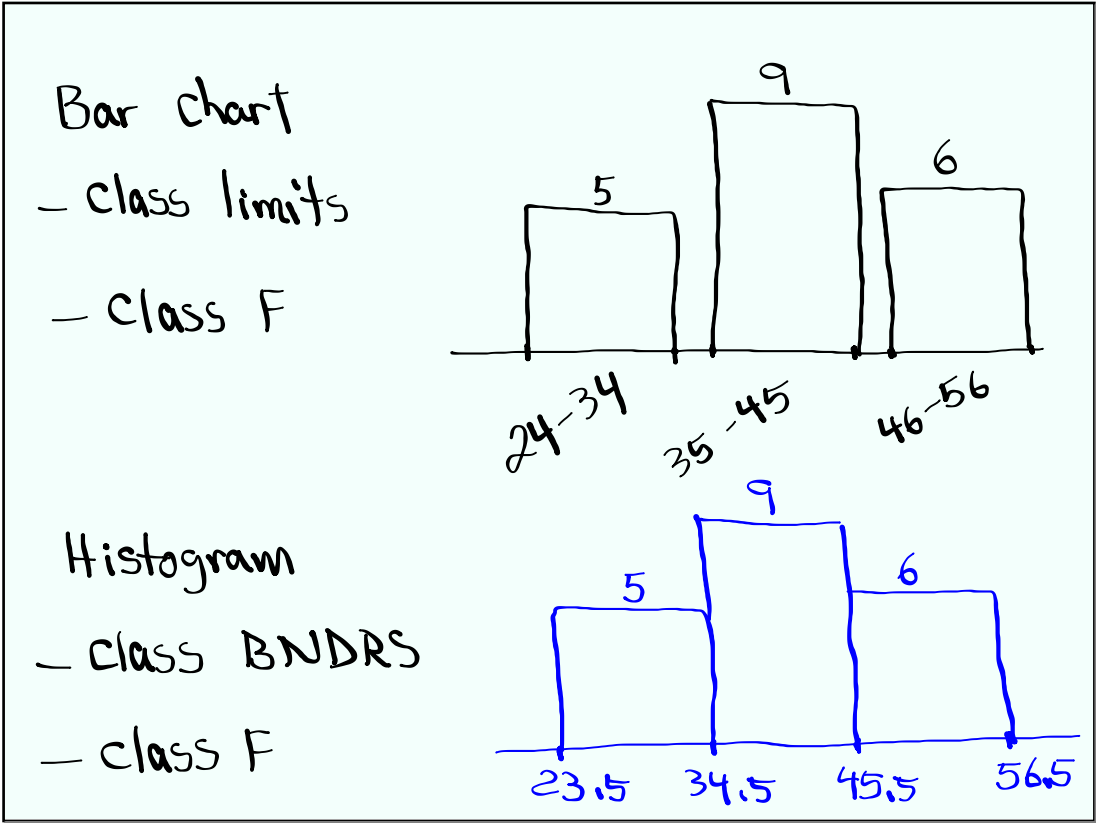
Sep 6-11:53 AM

Class limits	Class BNDRS	Class MP	Class F	Cum. F	Rel. F	% F
24 - 34	23.5 - 34.5	29	5	5	.25	25%
35 - 45	34.5 - 45.5	40	9	14	.45	45%
46 - 56	45.5 - 56.5	51	6	20	.30	30%

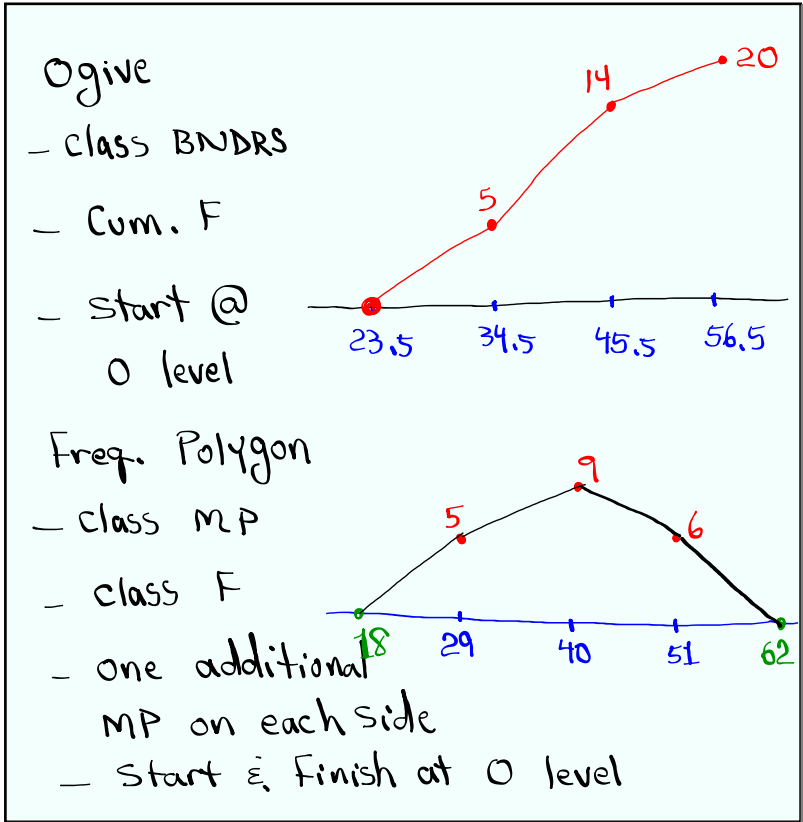
CW = 11, , Class MP = $\frac{\text{+ class limits}}{2}$

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

Sep 6-11:58 AM



Sep 6-12:13 PM



Sep 6-12:16 PM

Pie chart

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

STEM Plot
(Data must be Sorted)

24	26	27	30	32	2	4	6	7			
35	35	35	38	40	3	0	2	5	5	8	
42	43	43	43	48	4	0	2	3	3	8	9
49	50	51	53	54	5	0	1	3	4		

what % of nurses were at least 35 years old? $45\% + 30\% = 75\%$

what % of nurses were at most 30 yrs old? $\frac{4}{20} \cdot 100 = 20\%$

Sep 6-12:22 PM

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

58	59	62	65	68
70	72	75	75	75
79	80	84	85	86
86	86	88	90	92
92	95	98	100	100

- $n = 25$
- Range = $100 - 58 = 42$
- Midrange = $\frac{100 + 58}{2} = 79$
- Mode = 75, 86

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

$$\frac{\text{Range}}{4} = \frac{42}{4} = 10.5$$

Decimal \rightarrow CW = 11

Sep 6-12:45 PM

class limits	class BNDRS	class MP	class F	Cum. F	Rel. F	% F
58 - 68	57.5 - 68.5	63	5	5	.20	20%
69 - 79	68.5 - 79.5	74	6	11	.24	24%
80 - 90	79.5 - 90.5	85	8	19	.32	32%
91 - 101	90.5 - 101.5	96	6	25	.24	24%

$n=25$

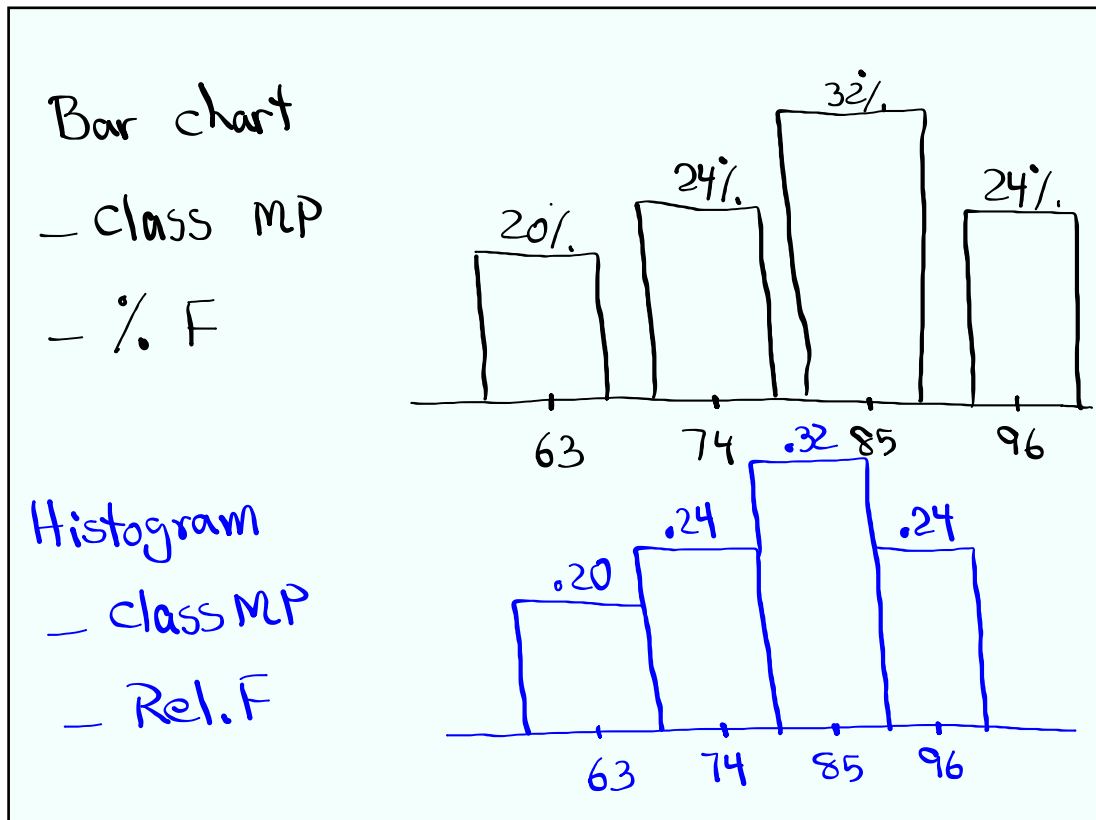
CW = 11, $\frac{68.5}{68 \quad 69}$, class MP = $\frac{\text{+class limits}}{2}$

Rel. F = $\frac{f}{n} = \frac{f}{25}$

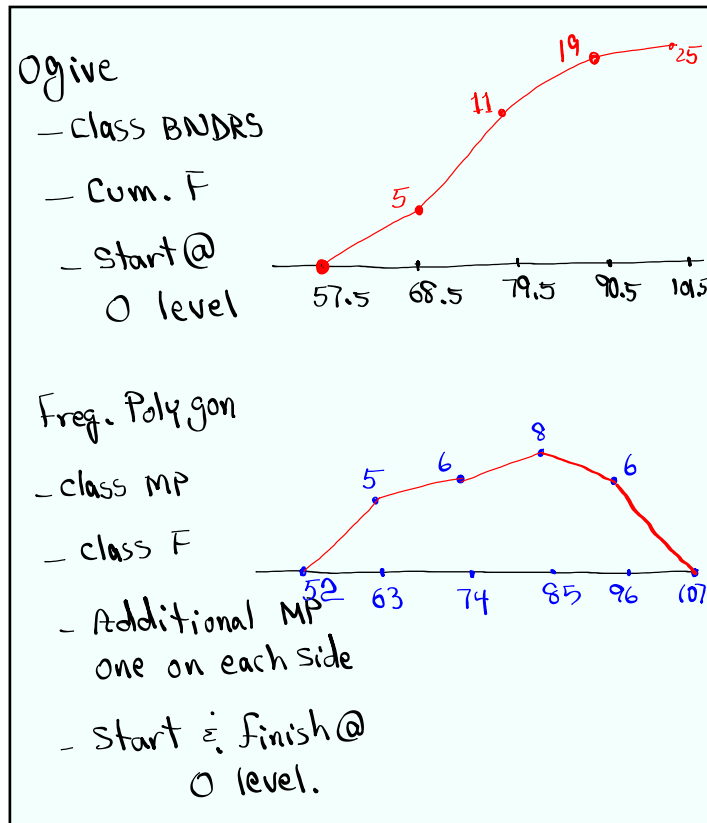
what % are between 69 to 90, inclusive?

$24\% + 32\% = 56\%$

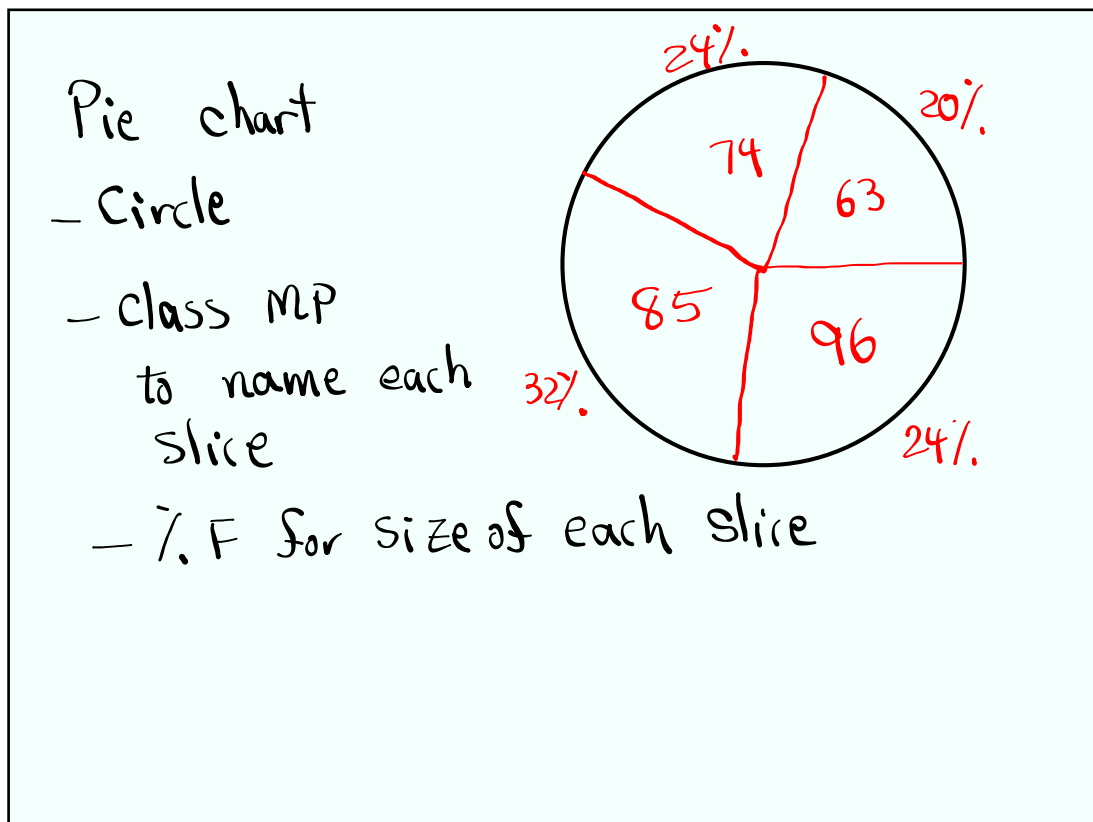
Sep 6-12:50 PM



Sep 6-1:03 PM



Sep 6-1:06 PM



Sep 6-1:13 PM

A sample has a min. of 15 and maximum of 55.

$$1) \text{Range} = \text{Max} - \text{Min} = 55 - 15 = \boxed{40}$$

$$2) \text{Midrange} = \frac{\text{Max} + \text{Min}}{2} = \frac{55 + 15}{2} = \boxed{35}$$

3) class width for 5 classes

$$\frac{\text{Range}}{5} = \frac{40}{5} = 8$$

$$\boxed{\text{CW} = 9}$$

4) class width for 3 classes.

$$\frac{\text{Range}}{3} = \frac{40}{3} = 13.\bar{3}$$

$$\boxed{\text{CW} = 14}$$

Sep 6-1:16 PM

$x \rightarrow$ Data element

SG 5-8

$\sum x \rightarrow$ sum of data elements

$n \rightarrow$ Sample Size

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

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

Consider the sample below

1 3 3 3 7

$$1) n = 5$$

$$2) \sum x = 1 + 3 + 3 + 3 + 7 = \boxed{17}$$

$$3) \bar{x} = \frac{\sum x}{n} = \frac{17}{5} = \boxed{3.4}$$

Sep 6-12:31 PM

Consider the Sample below

$$1 \quad 3 \quad 3 \quad 3 \quad 1) n = 8$$

$$5 \quad 5 \quad 5 \quad 9 \quad 2) \text{Range} = 9 - 1 = 8$$

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

$$5) \sum x = 1 + 3 + 3 + 3 + 5 + 5 + 5 + 9 = \boxed{34}$$

$$6) \bar{x} = \frac{\sum x}{n} = \frac{34}{8} = \boxed{4.25}$$

\rightarrow whole $\boxed{4}$
 \rightarrow 1-dec. $\boxed{4.3}$

Sep 6-1:40 PM

A Sample has a min. of 10, max of 30,

$$n = 8, \text{ and } \sum x = 50$$

$$1) \text{Range} = 30 - 10 = \boxed{20} \quad 2) \text{Midrange} = \frac{30+10}{2} = \boxed{20}$$

3) class width for 4 classes.

$$\frac{\text{Range}}{4} = \frac{20}{4} = 5 \quad \boxed{\text{CW} = 6}$$

$$4) \bar{x} = \frac{\sum x}{n} = \frac{50}{8} = \boxed{6.25}$$

Sep 6-1:45 PM

$x \rightarrow$ Data element

$n \rightarrow$ Same Size

$\sum x \rightarrow$ Add all data elements

$\sum x^2 \rightarrow$ Square every data element, then add them together.

$\bar{x} \rightarrow$ Sample Mean

$S^2 \rightarrow$ 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 6-1:49 PM

Consider the Sample below

2 3 3 3 8

1) $n = 5$ 2) Range = 6

3) Midrange = 5 4) Mode = 3

5) $\sum x = 2 + 3 + 3 + 3 + 8 = \boxed{19}$

6) $\sum x^2 = 2^2 + 3^2 + 3^2 + 3^2 + 8^2 = \boxed{95}$

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

8) $S^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 95 - 19^2}{5(5-1)}$
 $= \frac{114}{20} = \boxed{5.7}$

Sep 6-1:53 PM

Consider the Sample below

$$2 \quad 4 \quad 4 \quad 4 \quad 1) \quad n = \boxed{8}$$

$$6 \quad 6 \quad 6 \quad 10$$

$$2) \quad \sum x = 2 + 4 + 4 + 4 + 6 + 6 + 6 + 10 = \boxed{42}$$

$$3) \quad \sum x^2 = 2^2 + 4^2 + 4^2 + 4^2 + 6^2 + 6^2 + 6^2 + 10^2 = \boxed{260}$$

$$4) \quad \bar{x} = \frac{\sum x}{n} = \frac{42}{8} = \boxed{5.25}$$

$$5) \quad S^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{8 \cdot 260 - 42^2}{8(8-1)}$$

$$= \frac{316}{56} \approx \boxed{5.643}$$

Sep 6-1:59 PM

$x \rightarrow$ Data element

$n \rightarrow$ Sample Size

$\bar{x} \rightarrow$ Sample Mean

$S^2 \rightarrow$ Sample Variance

$S \rightarrow$ Sample Standard deviation

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

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

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

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

Sep 6-2:05 PM

Consider the Sample below

$$2 \quad 4 \quad 8 \quad 16 \quad 1) n=4$$

2) Mode None

$$3) \sum x = 2 + 4 + 8 + 16 = \boxed{30}$$

$$4) \sum x^2 = 2^2 + 4^2 + 8^2 + 16^2 = \boxed{340}$$

$$5) \bar{x} = \frac{\sum x}{n} = \frac{30}{4} = \boxed{7.5}$$

$$6) S^2 = \frac{n \sum x^2 - (\sum x)^2}{n(n-1)} = \frac{4 \cdot 340 - 30^2}{4(4-1)}$$

$$= \frac{460}{12} = 38.\bar{3} \approx \boxed{38.333}$$

$$7) S = \sqrt{S^2} = \sqrt{38.333} \approx \boxed{6.191}$$

Sep 6-2:09 PM

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

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

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

$$= \frac{0}{90} = \boxed{0}$$

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

Sep 6-2:16 PM

Given 1 3 5 7 9

1) $n = 5$

2) Mode None

3) $\sum x = 25$

4) $\sum x^2 = 165$

5) $\bar{x} = \frac{\sum x}{n} = \frac{25}{5} = \boxed{5}$

6) $S^2 = \frac{n\sum x^2 - (\sum x)^2}{n(n-1)}$
 $= \frac{5 \cdot 165 - 25^2}{5(5-1)}$

7) S , Round to a whole #

$S = \sqrt{S^2} = \sqrt{10} \approx 3.162$

↳ $\boxed{3}$

$= \frac{200}{20} = \boxed{10}$

Sep 6-2:20 PM

Class Quiz 1

Consider the Sample below

2 5 5 8 14 18

1) Range = $18 - 2 = \boxed{16}$

2) Midrange = $\frac{18+2}{2} = \boxed{10}$

3) Mode = $\boxed{5}$

4) $n = \boxed{6}$

Sep 6-2:26 PM