**Statistics**

**Summer 2021**
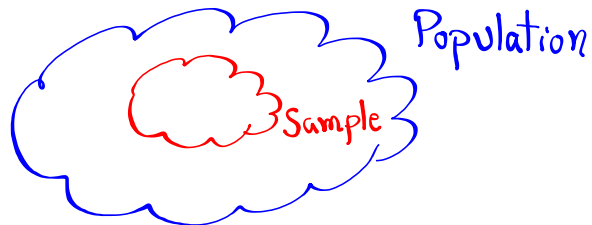
**Lecture 1**

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What is Statistics?

It is about collecting information (Data), organize them, graph them, Perform computations, and use the results to make predictions, study Prob. and Chances of certain outcome.

Two Branches:

1) Descriptive: Collect data, organize, graph, Computations.

2) Inferential: Draw Conclusion from data with Some degree of Confidence.
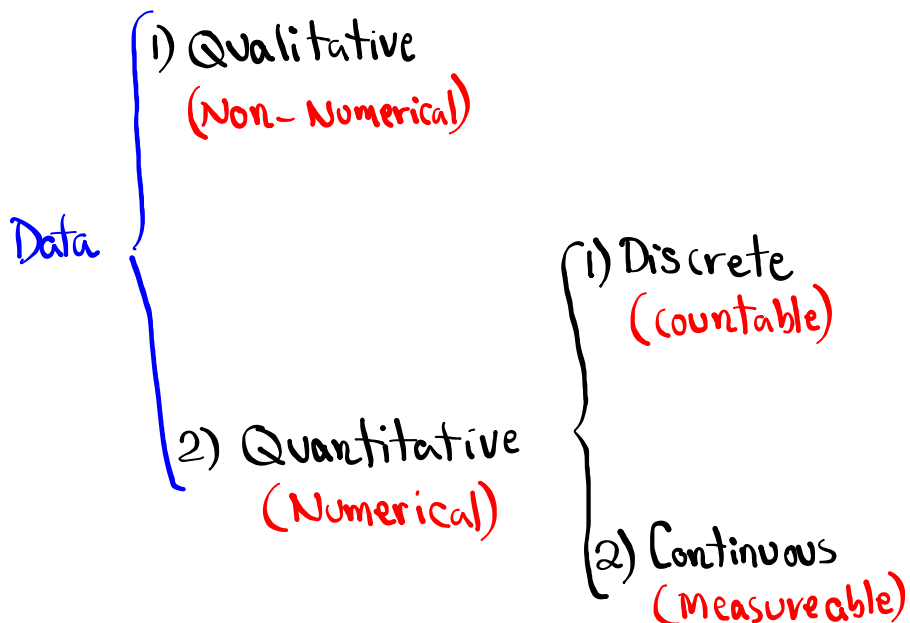
Data must be Collected randomly and it is Called Sample.

Sample is drawn/collected from entire field of interest called Population.



Population ⟺ Parameter

Sample ⟺ Statistic

Randomly Selected Data:

Data
1) Qualitative (Non-Numerical)
2) Quantitative (Numerical)
  1) Discrete (countable)
  2) Continuous (Measureable)

Level of measurements!

1) Nominal : Red, white, Blue

Medium, Large, Small

Sizes of shirt 10, 12, 18, 20

2) Ordinal : Small, Medium, Large

Shirt Size 10, 15, 20

3) Ratio : Small (10 oz) Large (20 oz)

4) Interval: Range of Values, 90% - 100% ⟹ A

5 oz - 7.49 oz ⟹ $3.25

Sampling Method:

1) Systematic : Every Kth item Selected.

2) Stratified: Divide into groups, select Few from each group.

3) Cluster : Divide into groups, Select Some of the groups, now collect data from all members of Selected groups.

4) Random/ Convenience : Least reliable Method

June 22, 2021

Name the Sampling Method:

Every 10th caller is selected for a Survey.

Systematic.

I randomly selected 75 freshmen, 150 Soph.,
200 Jr., 100 Sr., and 25 graduate students
from Cal Poly Pomona.    Stratified

Mt. SAC offers 1000 classes in Summer 2021.
100 classes are randomly selected, and all
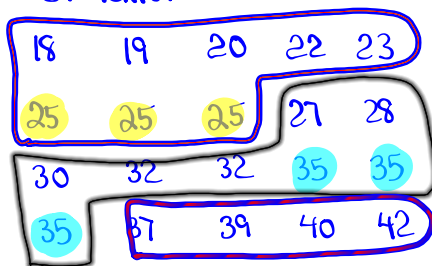students in those classes are to do a
Survey.    Cluster

SG 1 ✓
SG 2 ✓

You collect information from someone next to
you in the lobby of hospital. Convenience/Random

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Collect data: Organize & Graph        SG 3 & 4

the sample below represents
ages of randomly selected
students:

18  19  20  22  23
25  25  25  27  28
30  32  32  35  35
35  37  39  40  42

1) Sample Size  n = 20

2) Min = 18 , Max = 42

3) Range = Max - Min = $\boxed{24}$

4) Midrange = $\frac{Max + Min}{2}$ = $\boxed{30}$

5) Mode = 25 & 35
   Bimodal

6) class width to make a
Freq. table with 3 classes.
Class width = $\frac{Range}{\# classes}$ = $\frac{24}{3}$ = 8    $\boxed{CW = 9}$

IS decimal ⇒ Round up , IS whole # ⇒ Add 1

| Class limits | Class BNDRs | Class MP | Class F | Cum. F | Rel. F | % F |
|---|---|---|---|---|---|---|
| 18 – 26 | 17.5 – 26.5 | 22 | 8 | 8 | .40 | 40% |
| 27 – 35 | 26.5 – 35.5 | 31 | 8 | 16 | .40 | 40% |
| 36 – 44 | 35.5 – 44.5 | 40 | 4 | 20 | .20 | 20% |

$$\text{Class MP} = \frac{+ \text{ Class limits}}{2}$$ , $$\text{Rel. F} = \frac{f}{n} = \frac{f}{20}$$ ,
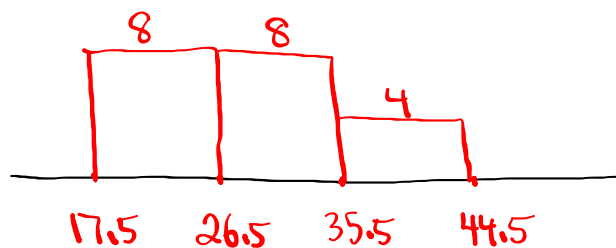
26.5
26 • 27

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Draw Bar Chart

— class limits

— class F

8   8

4

18-26   27-35   36-44
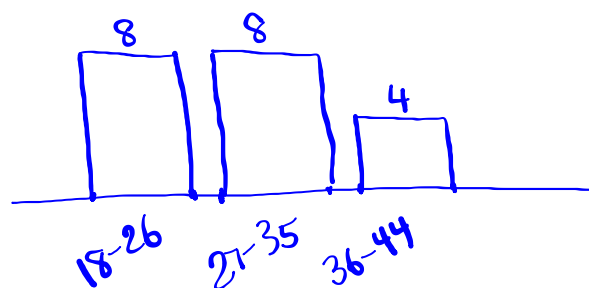
Draw Histogram

— class BNDRS

— Class F

8   8

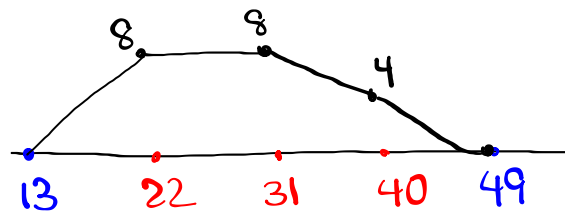4

17.5   26.5   35.5   44.5

## Ogive
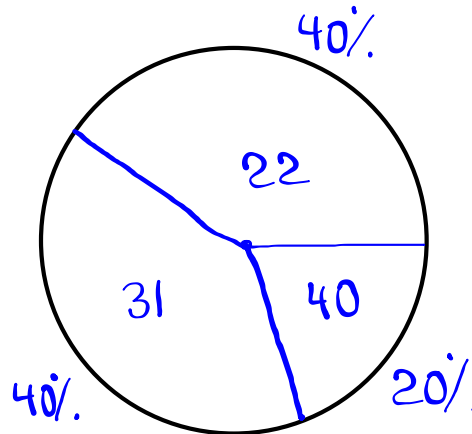
— Class BNDRS

— Cum. F.
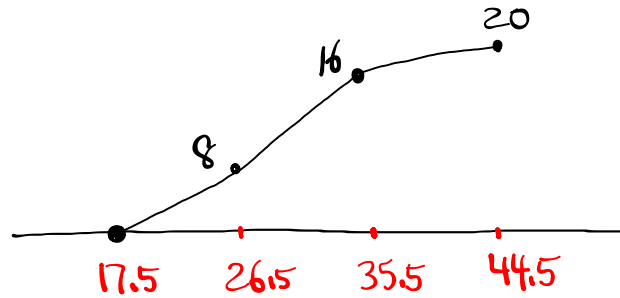


## Freq. Polygon
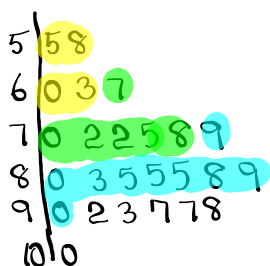
— Class MP

— Extra MP
  one on each side

— Class F



## Pie Chart

— % F

— Class MP

— Circle



SG 3 & 4.

25 exams were randomly selected. Scores are displayed below in a STEM Plot

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

1) Sample Size $\boxed{n = 25}$

2) Min = 55, Max = 100

3) Range = Max − Min = 45

4) Midrange = $\dfrac{Max + Min}{2}$ = 77.5

5) Mode = 85

6) Class width for 4 classes.
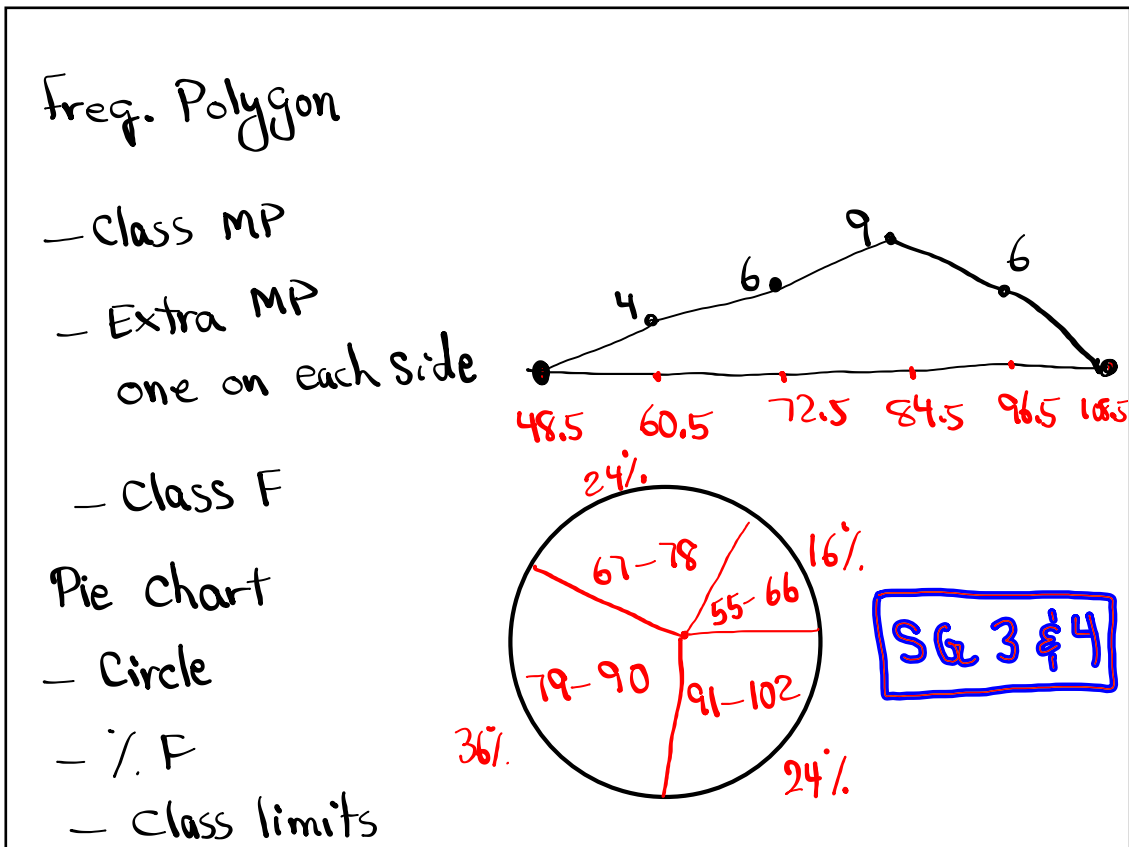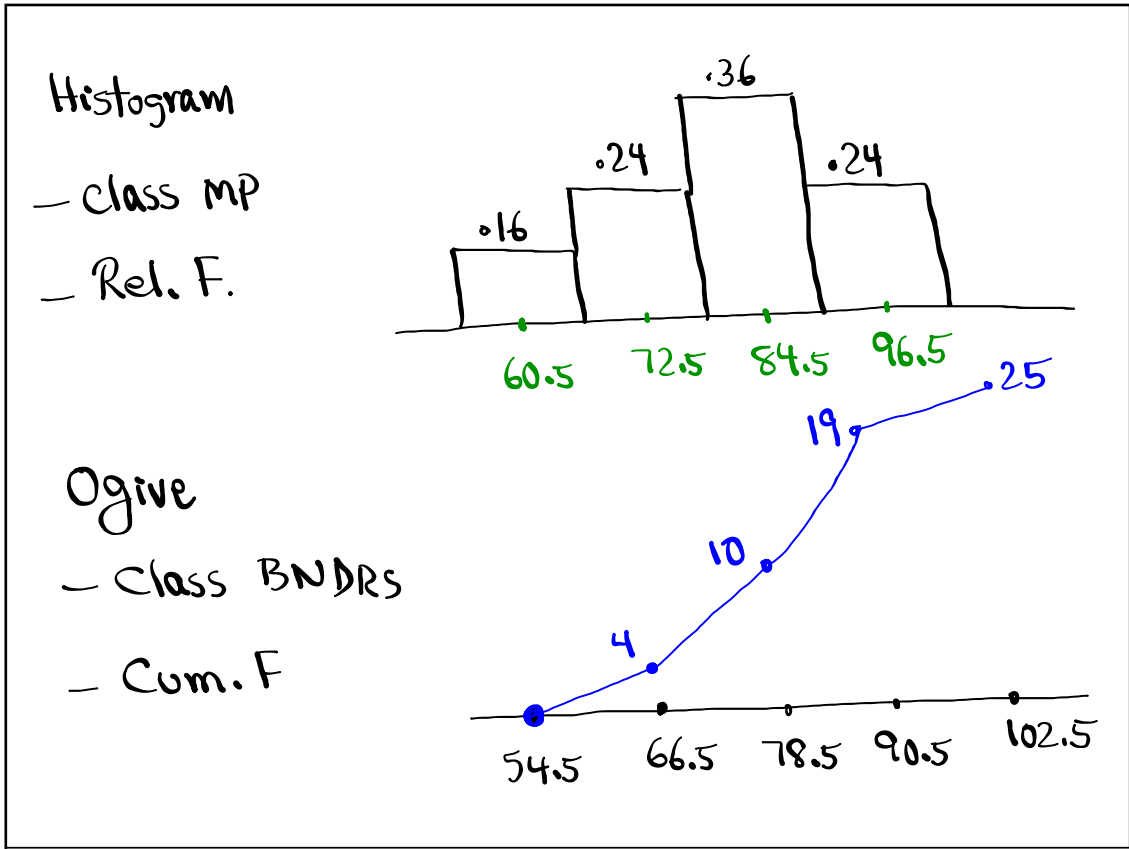
$CW = \dfrac{Range}{4} = \dfrac{45}{4} = 11.25$

if decimal ⟹ Round-up

if whole # ⟹ Add 1

$\boxed{CW = 12}$

| Class limits | Class BNDRS | Class MP | Class F | Cum F | Rel. F | %.F |
|---|---|---|---|---|---|---|
| 55 − 66 | 54.5 − 66.5 | 60.5 | 4 | 4 | .16 | 16% |
| 67 − 78 | 66.5 − 78.5 | 72.5 | 6 | 10 | .24 | 24% |
| 79 − 90 | 78.5 − 90.5 | 84.5 | 9 | 19 | .36 | 36% |
| 91 − 102 | 90.5 − 102.5 | 96.5 | 6 | 25 | .24 | 24% |

Class MP = $\dfrac{+ Class\ limits}{2}$ , Rel. $f = \dfrac{f}{n} = \dfrac{f}{25}$ ,

```
      66.5
   •---•---•
  66      67
```

Histogram

– Class MP

– Rel. F.

.36

.24

.24

.16

60.5  72.5  84.5  96.5

Ogive

– Class BNDRS

– Cum. F

.25

19

10

4

54.5  66.5  78.5  90.5  102.5

Freq. Polygon

– Class MP

– Extra MP
  one on each side

– Class F

9

6

6

4

48.5  60.5  72.5  84.5  96.5  108.5

Pie chart

– Circle

– % F

– Class limits

24%

67–78

16%

55–66

79–90

91–102

36%

24%

SG 3 & 4

Class Qz 1

1) Simplify : $\dfrac{82 - 70}{\sqrt{16}}$

2) Solve $\quad 2.5x - 12 = 8$

3) Graph $\quad y = \dfrac{3}{4}x - 3$