

## Lecture #01

### Variable:

- Any characteristic whose value can change from one element to another.
- Any characteristic that can assume different values.

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### Data:

Set of information about variable.

Basically variable have 2 categories.

1) Qualitative

Those variables which can't be numerically measured.

2) Quantitative

Those variable that which can be numerically measured

→ Data also has 2 categories .

Qualitative

Quantitative

Data about qualitative variables  
e.g; Blood group

Data about quantitative like-  
CGPA, Weight

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Variables  
Quantitative

Discrete

Countable

Variable (How many)

Continuous

Measurable Variable  
(How much)

Population: Entire set of items from which you draw for a statistical study. It can be a group, individual or a set of items.

Sample: It is an analytical subset of a larger population; a smaller & more manageable representation of a large group.  
Sample has 2 categories.



Random

Non-Random

Each Sample has chance to be selected. Sample is selected on personal judgement.

We choose random sample in any case. each sample does not have the chance to be selected.

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Known  
of

→ Re

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Population

Finite

Known number  
of element

Infinite

Unknown number  
of element

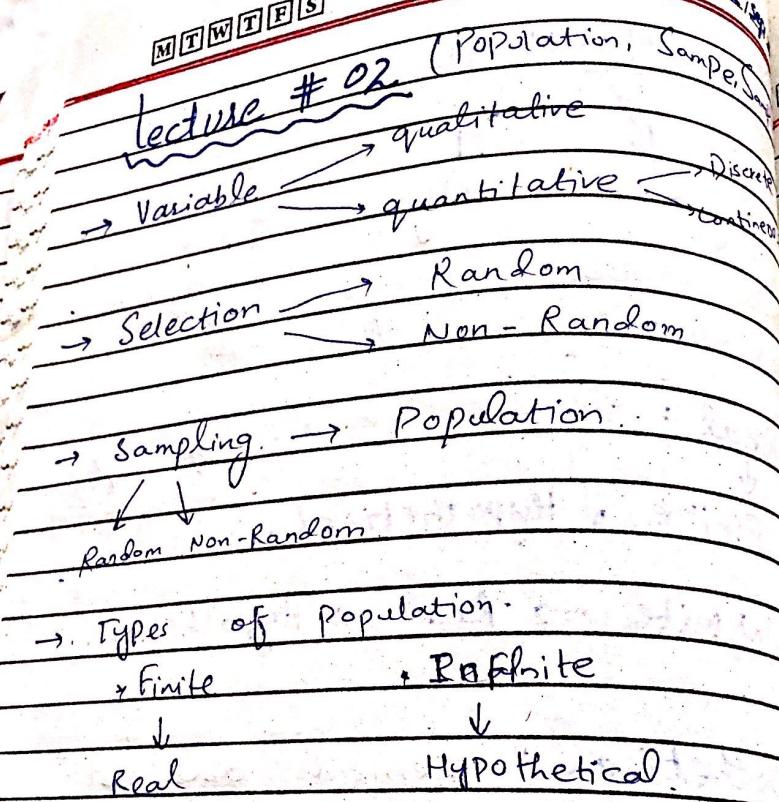
→ Real : element exist physically.  
↓  
Finite, Hypothetical.

→ Infinite → Real → Hypothetical.

Hypothetical : Element does not  
exist physically.

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## lecture # 02 (Population, Sample, Sampling Methods)



**Population:** (<sup>N</sup> collection of objects)

Population size =  $n \rightarrow$  Sample.

Sampling e.g.; student of a class

Random Non-Random

### Types of Population

Real

Hypothetical Target Sample

e.g., stu

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Figure:

### Types

Simple random sampling  
(when you whole population sample is sure to be included)

### Method

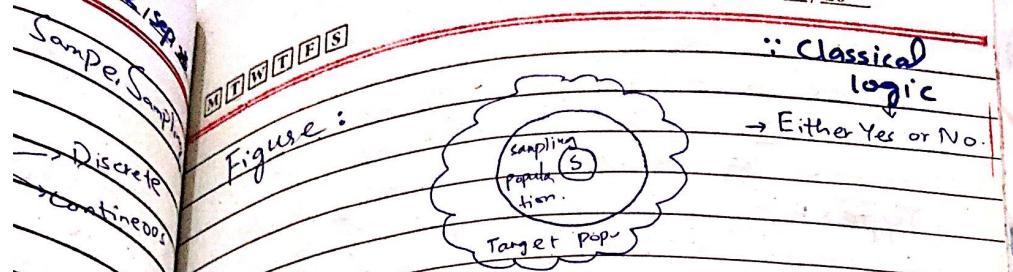
- Systematic
- Stratified
- Cluster
- Simple

### Method

- Convenience
- Judgmental
- Quota
- Snowball

Value Sample

Value



## Types of Sampling:

↓ probability

Simple Random  
Sampling.

(when you select  
whole population.)

↓ Non- Probability

sure Representative (Heterogenous)      Population Inter vls  
Method | Techniques : (Probability)       $n = K$

→ Systematic Sampling (orders, Sequence, systematic order)

→ Stratified Sampling (make groups / Bins & then select)

→ Cluster Sampling

→ Simple Random Sampling.

## Method | Techin : (Non - Probability).

→ Convenience Sampling.

→ Judgement Sampling.

→ Quota Sampling.

→ Snowball Sampling.

→ Value which represent | Summarize From  
Sample called Statistic. (statistic)

→ Value which represent from Population  
Called Parameters. (Parameters)

Date:

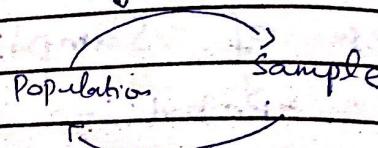
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### Statistic: (Presentation)

Statistic is a science of conducting studies to collect, organize, summarize and analyze to draw conclusion from data.

Types:

Descriptive, Inferential



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Lecturing  
making  
own data.

### Lecture #03:

- Data Visualizations:  
1- What — Introduction.  
2- Why — object.  
3- How — Method.  
4- Which — Best.

### Presentation of data

Summarize, organize & communicate information using a variety of tools, such as diagram, distribution charts, histograms & graphs.

- It removes complexity & highlights features of data.
- Comparison b/w data.

### Arrangement of data:

from lowest to highest

### 1. Stem & Leaf method:

#### 1) Example:

Construct a stem & leaf display for the following data:

70, 72, 75, 64, 58, 83, 80, 82, 76, 75, 68, 65, 57, 78, 85, 72.

Stem	Leaf
7	0, 2, 5, 6, 5, 8, 8, 2
6	4, 8, 5
5	7, 8

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8 0, 3, 2, 5

2) 11.3, 9.6, 10.4, 7.5, 8.3, 10.5, 10.0  
 9.3, 8.1, 7.7, 7.5, 8.4, 6.3, 8.8  
 Stem leaf

Arrange: 6.3, 7.7, 7.5, 7.5, 8.3, 8.4, 8.8  
 8.1, 9.3, 9.6, 10.0, 10.4, 10.5, 11.3

↓ Stem Leaf

6	3
7	7, 5, 5
8	1, 3, 4, 8,
9	3, 6
10	0, 4, 5
11	3

## 2. Tabular Method:

→ Decide how much classes.

$$K = 1 + 3.22 \log N, \text{ Denote No of class}$$

→ Determine Range  $R = \text{Max} - \text{Min value}$

→ Determine class width Class Interval  $H$ :

→ Determine location of class.

→ Distribute data b/w class.

→ Make frequency column.

$$\text{Range} = \text{max} - \text{min}$$

no of classes.

Frequency Distribution: ↑

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Example:  
 2, 4, 8, 11, 8, 11  
 N =

(a). Frequency  
 K =

K =

(b) Class  
 W =

=  
 W

(c) Make  
 Class

1 - 6

7 - 12

13 - 18

19 - 24

25 - 30

31 - 36

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Example:

2, 4, 8, 11, 12, 15, 17, 19, 24, 19, 5, 14  
N = 20

Distribution.

(a). Frequency  
 $K = 1 + 3.22 \log(20)$

$K = 5.189$

$K = 5$

(b) Class width:  
 $W = \frac{\text{max} - \text{min}}{K}$

$= \frac{32 - 1}{5} = \frac{31}{5} = 6$

W = 6

(c) Make classes.

Class	Frequency
1-6	19
7-12	4
13-18	1
19-24	2
25-30	1
31-36	1

K