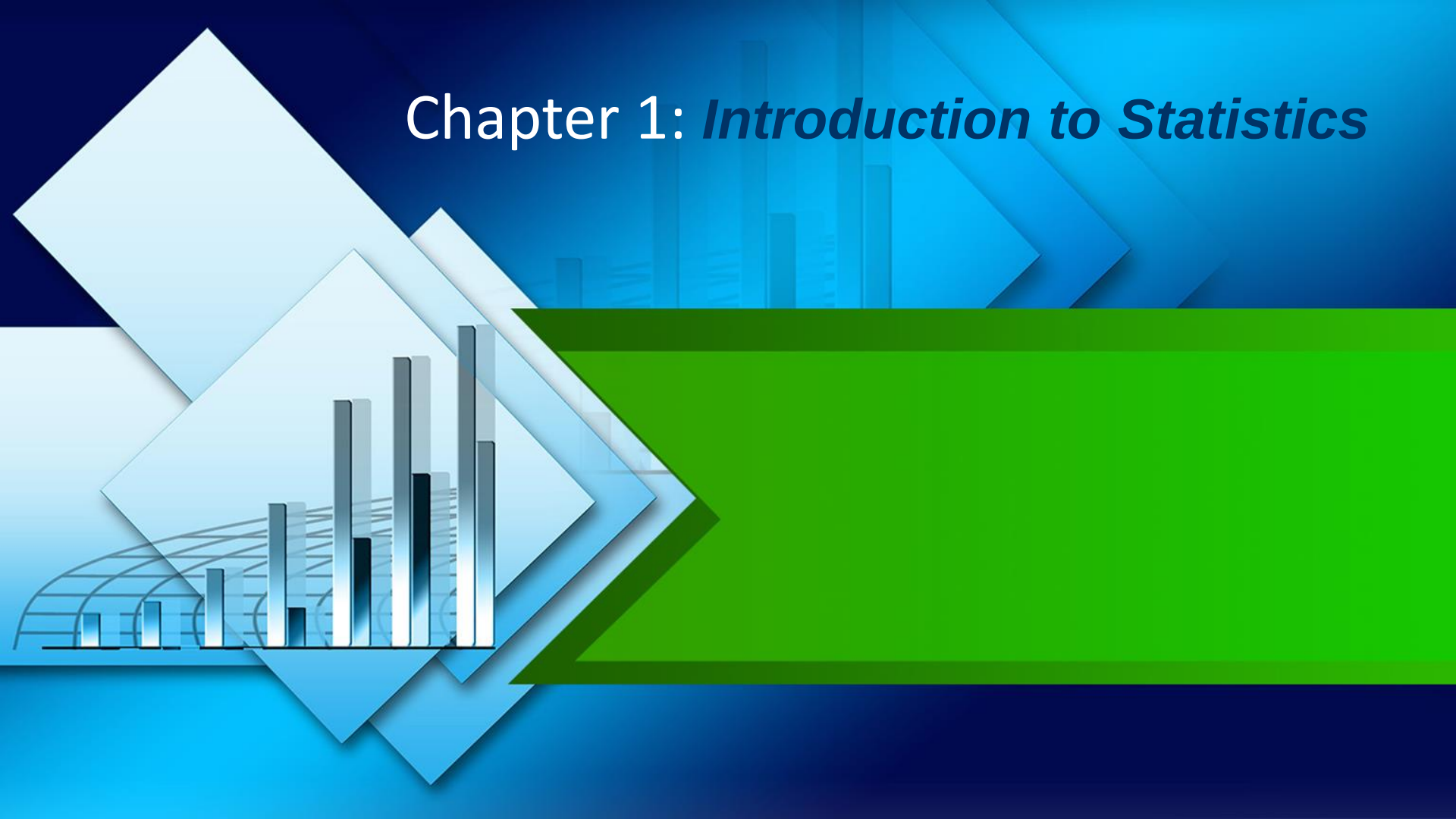
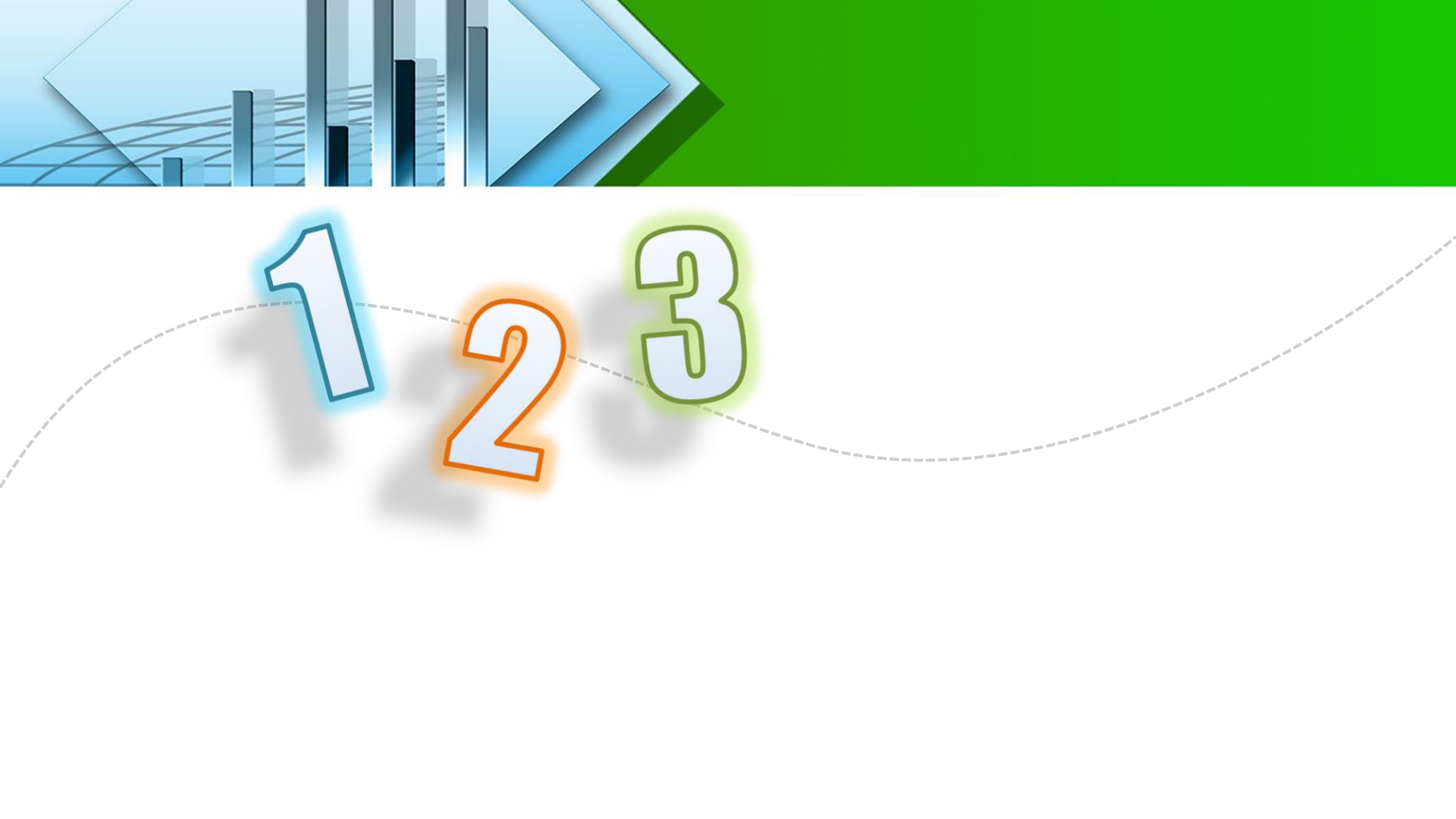
Chapter 1: *Introduction to Statistics*

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Learning Outcomes

When you will complete this chapter, you would be able to-

- Understand the purpose of statistics.
- Know the differences between descriptive and inferential statistics.
- Understand the differences between a sample and a population.

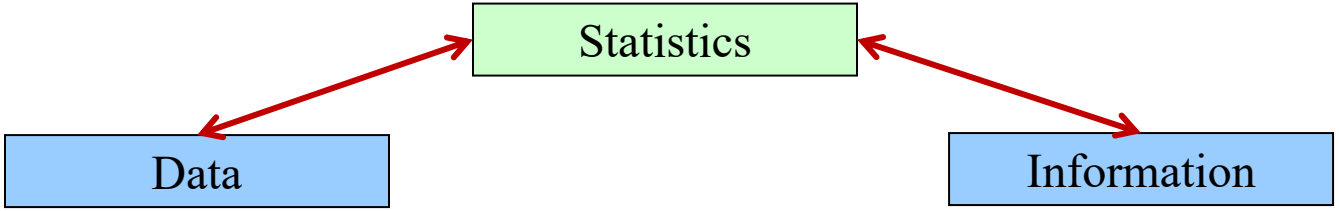
Contents

From this lecture, you are going to learn…

- ❑Statistics and types of statistics
- ❑Population and sample
- ❑Parameter and statistic
- ❑Sampling Techniques

What is Statistics?

"Statistics is a way to get information from data"



Statistics is a ***tool*** for creating ***new understanding*** from a set of numbers.

Definitions: Oxford English Dictionary

What is Statistics?

STATISTICS is the science of collecting, organizing, presenting, analyzing, and interpreting data to assist in making more effective decisions.

Collect	Gathering of facts or data
Organize	Arranging data for the presentation
Present	Summarizing data in textual, graphical, or tabular forms.
Analyze	Describing the data by using statistical methods and procedures.
Interpret	Making conclusions based on the analyzed data.

Branches of Statistics or Types of Statistics

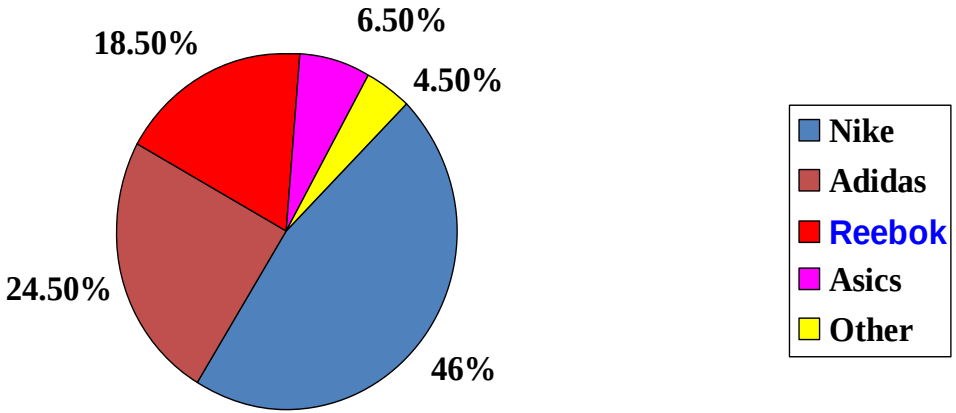
Branches of Statistics or Types of Statistics

Descriptive Statistics Involves organizing, summarizing, and displaying data.

e.g. Tables, charts, averages .

Inferential Statistics Involves using **sample data** to draw conclusions about a **population.**

Descriptive Statistics



EXAMPLE : Pie Chart For showing favorite type of running shoes of 200 runners.

Inferential Statistics

Example:

The accounting department of a large firm will select a sample of the invoices to check for accuracy for all the invoices of the company.

Exercise: Descriptive Vs Inferential Statistics

A follow up study was conducted among male who were aged 48, for 18 years. For men who took unhygienic food, approximately 70% were alive at age 65. For men who took hygienic food, 90% were alive at age 65.

For this example

Descriptive Statistics

- For men who took unhygienic food, approximately 70% were alive at age 65.
- For men who took hygienic food, 90% were alive at age 65.

A possible conclusion that means Inference is:

- Taking hygienic food is associated with a longer life for men.

Population VS Sample

Population:

The collection of all possible individuals, objects, or measurements of interest.

"ALL"

Sample:

Representative part of the population

"SOME"

Example:

Population – Total number of DIU students during the year 2011

Sample – Few selected students of DIU during the year 2011

Census, Parameter VS Statistic

- **Census:** Collection of data from every member of a population.

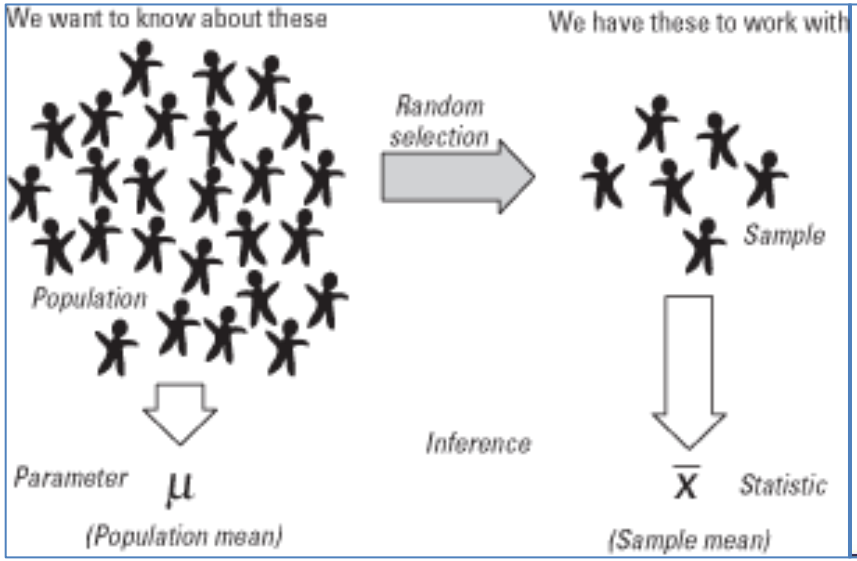
- Parameter: measurable characteristic of a population. It is usually referred to true or actual value.

Example: *average* CGPA from all the DIU students.

- Statistic: measurable characteristic of a sample.

Example: *average* CGPA from few students of DIU

Population, Sample, Parameter, Statistic
At a glance….



population of interest:

students on the robotics team

variable:

number of siblings

2 3 2 1 1 0 1 2 1 0 4 1

sample statistics:

mean:

$\bar{x} = 1.5$

standard dev:

$s_x = 1.3$

population parameters:

mean:

$\mu = 1.5$

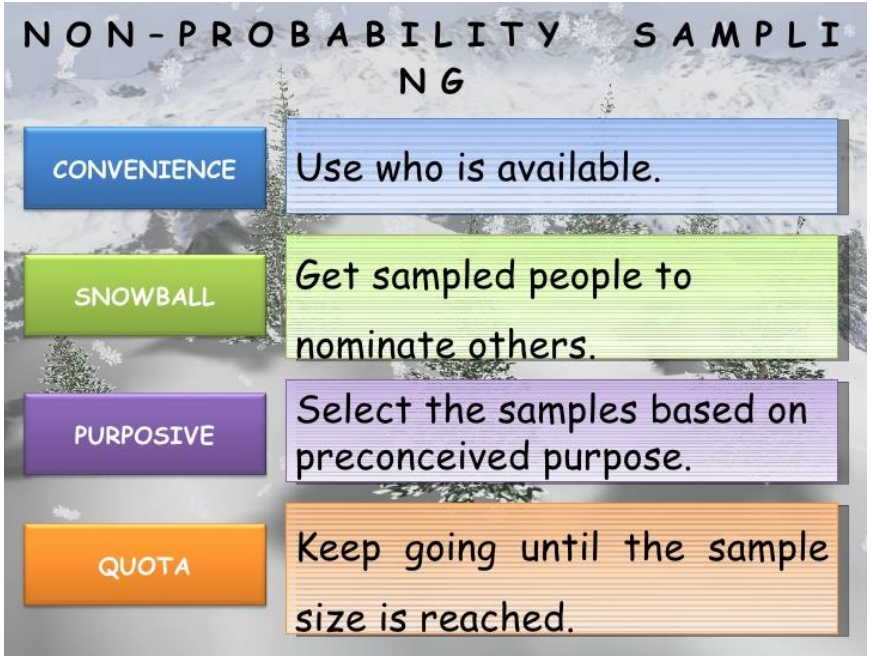
standard dev:

$\sigma_x = 1.1$

Sampling Techniques

Probability Sampling

Simple Random	Select from a full list of the population (sampling frame). Can use a random number table to do this.
Systematic	Start at random, at a point on the sampling frame, and choose every tenth case (or some other frequency) depending on sampling frame size.
Stratified	Sampling frame stratified (for example by class, race, sex) then random sampling
Cluster	Population divided into units or clusters each containing individuals in a range of circum-stances (for example, different types of young offender institution could be sampled).
Multi-stage	An extension of the cluster sample, in which samples are drawn from within clusters (for example sampling by age, sex and ethnicity from within young offender institutions identified through cluster sampling).




Thank
You