

## Sampling Distribution and Estimation

Lab: 1

Date: 2080/02/29

### PROJECT 1.1: FOR UNGROUPED DATA

#### OBJECT:

ENTER THE FOLLOWING VALUES IN SPSS AND CALCULATE MEAN, S.D, RANGES, MODE, MEDIAN

WEIGHTS: 25, 35, 45, 55, 65, 75

#### WORKING EXPRESSIONS:

We have,

- i. Mean ( $\bar{X}$ ) =  $\frac{\sum x}{n}$
- ii. Median ( $M_d$ ) =  $\frac{n+1}{2}$
- iii. Standard Deviation (S.D.) =  $\sqrt{\frac{\sum (X - \bar{X})^2}{n}}$
- iv. Range = max – min
- v. Mode = maximum repetition of data
- vi. Standard error (S.E.) =  $\frac{S.D.}{\sqrt{n}}$

Note: Where  $\sum x$  represents the sum of all the items in the dataset and n represent the number of items in the given dataset.

#### PROCESS:

Solution:

1. Select **Analyze** → **Descriptive statistics** → **Descriptives**
2. Click the **Descriptives** → Move **Midvalue** into **Variables(s)**.
3. Click the **Option**. Select **Mean, s.d., ranges, mode, median**
4. Click **Ok**

From SPSS,

MEAN, S.D, RANGES, MODE, MEDIAN FROM THE GIVEN DATA IS SHOWN THROUGH THE TABLE

### Statistics

Weights

N	Valid	6
	Missing	0
Mean		49.83
Std. Error of Mean		7.705
Median		50.00
Mode		25 <sup>a</sup>
Std. Deviation		18.872
Variance		356.167
Range		50
Minimum		25
Maximum		75

### RESULT:

From the above table, the following results were obtained:

- I. Average of the given data (Mean) = 49.83
- II. Median = 50.00
- III. Standard Deviation (S.D.)= 18.872
- IV. Range of a weight = 50
- V. Mode = 25 (Multiple modes exists. The smallest value is shown)

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### PROJECT 1.2: FOR UNGROUPED DATA

#### OBJECT:

ENTER THE FOLLOWING VALUES IN SPSS AND CALCULATE MEAN, S.D, RANGES, MODE, MEDIAN

WEIGHT	MID VALUE	FREQUENCY
20-30	25	4
30-40	35	6
40-50	45	7
50-60	55	21
60-70	65	23
70-80	75	2

#### WORKING EXPRESSIONS:

We have,

- i. Mean  $(\bar{X}) = \frac{\sum x}{n}$
- ii. Median  $(Md) = \frac{n+1}{2}$
- iii. Standard Deviation  $(S.D.) = \sqrt{\frac{\sum (X-\bar{X})^2}{n}}$
- iv. Range = max – min
- v. Mode = maximum repetition of data
- vi. Standard error  $(S.E.) = \frac{S.D.}{\sqrt{n}}$

Note: Where  $\sum x$  represents the sum of all the items in the dataset and n represent the number of items in the given dataset.

#### PROCESS:

Solution:

1. Enter the **Data Editor Window**.

2. Select **Data** → **Weight Cases**.
3. Move **Frequency** into **Frequency Variable**
4. Click **Ok**. Select **Analyze** → **Descriptive statistic** → **Frequencies**
5. Click the **frequencies** → Move **MidValue** into **Variable(s)**
6. Click the **Statistics**. Select **Mean**.
7. Click **Continue**. Click **Ok**.

From SPSS,

Statistics		
Mid_value		
N	Valid	63
	Missing	0
Mean		54.37
Median		55.00
Mode		65
Std. Deviation		12.556
Range		50

## RESULT:

From the SPSS output table, the following results are obtained:

- i. Mean = 54.37
- ii. Median = 55.00
- iii. Mode = 65
- iv. Standard Deviation (S.D) = 12.556
- v. Range = 50

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**PROJECT 1.3: ENTER THE FOLLOWING DATA IN SPSS**

**OBJECT: GIVEN DATA IS:**

WEIGHT	MID VALUE	FREQUENCY
20-30	25	4
30-40	35	6
40-50	45	7
50-60	55	21
60-70	65	23
70-80	75	2

### WORKING EXPRESSIONS:

We have,

- i. Mean  $(\bar{X}) = \frac{\sum x}{n}$
- ii. Median  $(Md) = \frac{n+1}{2}$
- iii. Standard Deviation  $(S.D.) = \sqrt{\frac{\sum (X - \bar{X})^2}{n}}$
- iv. Range = max – min
- v. Mode = maximum repetition of data
- vi. Standard error  $(S.E.) = \frac{S.D.}{\sqrt{n}}$

Note: Where  $\sum x$  represents the sum of all the items in the dataset and n represent the number of items in the given dataset.

### PROCESS:

In this task, we will create four types of variables: Numeric, data, string and binary.

1. Click the **Type in data tab**.
2. Click the **Variable View** tab at the bottom of the window.

3. With the cursor in the Name column on the first row type: **Weight**, on the second row type: **Midvalue**, on the third row type: **Frequency**.
4. In the Type column, click the **Numeric** to open the Variable Type dialog box.
5. Select (Click) **String**.
6. Click **Ok**.
7. Press tab or Enter three times to move to **label column**.
8. Type “The weight of 63 students of a school”.
9. Click the **Data View** tab at the bottom of the window.
10. Enter the values as follows. Then save file.

After following above process, following results were seen:

### Variable View:

\*Project 1.3.sav [DataSet2] - IBM SPSS Statistics Data Editor

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Weights	String	8	0	The weight of 63 students of a school	None	None	8	Left	Nominal	Input
2	Mld_Value	Numeric	8	0		None	None	9	Right	Scale	Input
3	frequency	Numeric	8	0		None	None	8	Right	Scale	Input

### Data View:

\*Project 1.3.sav [DataSet2] - IBM SPSS Statistics Data Editor

	Weights	Mld_Value	frequency	var	var	var	var	var	var
1	20-30	25	4						
2	30-40	35	6						
3	40-50	45	7						
4	50-60	55	21						
5	60-70	65	23						
6	70-80	75	2						

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**PROJECT 1.4:** CONFIDENCE INTERVAL FOR POPULATION MEAN  $\mu$ , ( $\sigma$  UNKNOWN AND LARGE  $n$ )

### OBJECT:

ENTER THE FOLLOWING VALUES IN SPSS AND CREAT A CONFIDENCE INTERVAL ASSUMING NORMAL DISTRUBUTION

LENGTH: 125, 120, 121, 123, 122, 130, 124, 122, 120, 122, 118, 119, 123, 124, 122, 124, 121, 122, 138, 149, 123, 128, 122. 130. 120, 122, 124, 134, 137, 128, 122, 121, 125, 120, 132, 130, 128, 130, 122, 124

### WORKING EXPRESSIONS:

- i. Mean ( $\bar{X}$ ) =  $\frac{\sum x}{n}$
- ii. Median (Md) =  $\frac{n+1}{2}$
- iii. Standard Deviation (S.D.) =  $\sqrt{\frac{\sum (X-\bar{X})^2}{n}}$
- iv. Range = max – min
- v. Mode = maximum repetition of data
- vi. Standard error (S.E.) =  $\frac{S.D.}{\sqrt{n}}$
- vii. Confidence Interval (C.I.) =  $\bar{X} \pm Z \frac{S.D.}{\sqrt{n}}$

Note: Where  $\sum x$  represents the sum of all the items in the dataset and  $n$  represent the number of items in the given dataset.

### PROCESS:

1. Enter the **data**.
2. Select **Analyze** → **Compare Means** → **One sample T test**
3. Click **Options** → Type % (90, 95, 99) **confidence interval**
4. Click on **Continue** and then Click **Ok**.

From SPSS, the confidence interval after entering the given value in SPSS is:

### One-Sample Test

Test Value = 0

	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Length	128.879	39	.000	125.275	123.31	127.24

### RESULT:

Using SPSS, the confidence interval of the given data is 125.275, 127.4 at 95% confident level.