Visvesvaraya Technological University

"Jnana Sangama", Belagavi – 590018

Third Semester B.E.

[As per Choice Based Credit System (CBCS) Scheme]

(For Internal Circulation Only)

Ability Enhancement Course – III

Data Analytics with Excel (BCS358A)

Lab Manual

Name	
USN	
Section	
Lab Batch	
Day/Time	

Kalpataru Institute of Technology, Tiptur -572 201

Department of Artificial Intelligence and Machine Learning.

AY: 2024-2025

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Ability Enhancement Course – III

DATA ANALYTICS WITH EXCEL

LAB MANUAL

BCS358A

III Semester

KALPATARU INSTITUTE OF TECHNOLOGY, TIPTUR

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

2024-25

KALPATARU INSTITUTE OF TECHNOLOGY

(Accredited by NAAC with B+, Approved by A.I.C.T.E. New Delhi, Recognized by Govt. of Karnataka & Affiliated to V.T U., Belagavi)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Vision and Mission of the Institution

Vision

"To bring forth technical graduates of high caliber with a strong character and to uphold the spiritual and cultural values of our country."

Mission

"To impart quality technical and managerial education at graduate and post graduate levels through our dedicated and well qualified faculty."

Vision and Mission of the AI & ML Department

Vision

"To create a community of AI and ML specialists distinguished by their technical excellence and moral principles, who champion responsible innovation and honor our country's spiritual and cultural traditions, advancing technology for the betterment of society."

Mission

M1: "To advance AI and ML through ground-breaking development, encouraging students and faculty to pursue innovative solutions that address global challenges and drive societal progress."
M2: "To provide a supportive and inclusive environment that nurtures the intellectual and personal growth of our students, preparing them to become leaders in AI&ML."
M3: "To integrate the nation's spiritual and cultural values into the AI and ML curriculum, fostering respect for our heritage and guiding students to consider the cultural impacts of their innovations."

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Program Outcomes	
a.	**Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
b.	**Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences
c.	**Design/ Development of Solutions**: Design solutions for complex engineeringproblems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
d.	**Conduct investigations of complex problems** using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
e.	**Modern Tool Usage**: Create, select and apply appropriate techniques, resources andmodern engineering and IT tools including prediction and modeling to Complex engineering activities with an under- standing of the limitations.
f.	**The Engineer and Society**: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and theConsequent responsibilities relevant to professional engineering practice.
g.	**Environment and Sustainability**: Understand the impact of professional Engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
h.	**Ethics**: Apply ethical principles and commit to professional ethics and Responsibilities and norms of engineering practice.
i.	**Individual and Team Work**: Function effectively as an individual, and as amember or leader in diverse teams and in multi-disciplinary settings.
j.	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
k.	**Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change.
l.	**Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in Multidisciplinary environments.
Program Specific Outcomes	
m.	**PSO1:** The ability to comprehend, analyse, and apply knowledge of human cognition, Artificial Intelligence, Machine Learning, and data engineering to real-world problems, addressing future challenges.
n.	**PSO2**: The ability to cultivate computational knowledge and project development skills, utilizing innovative tools and techniques to address problems in Deep Learning, Machine Learning, and Artificial Intelligence.

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Course Objectives

- **Apply analysis techniques to datasets in Excel:** Utilize Excel's tools and functions to analyses various types of data.
- **Learn how to use Pivot Tables and Pivot Charts to streamline your workflow in Excel:** Understand and effectively use Pivot Tables and Pivot Charts to summarize and visualize data.
- **Understand and identify the principles of data analysis:** Grasp the fundamental concepts and principles of data analysis.
- **Become adept at using Excel functions and techniques for analysis:** Develop proficiency in using Excel's functions and techniques to perform data analysis tasks.
- **Build presentation ready dashboards in Excel:** Create visually appealing and informative dashboards in Excel to effectively communicate data insights.

Course Outcomes

By the end of this course, students will be able to:

- **Use advanced functions and productivity tools:** Employ advanced Excel functions and productivity tools to enhance their worksheet development.
- **Manipulate data lists:** Effectively manipulate data lists using Outline and PivotTable features.
- **Consolidate data:** Summarize and report data from multiple worksheets using consolidation techniques.
- **Apply Macros and Autofilter:** Solve real-world scenarios by utilizing Macros and Autofilter to automate tasks and filter data.

Introduction to Excel

Microsoft Excel is a powerful spreadsheet software that is widely used for various tasks, including data analysis, financial modeling, budgeting, and more. It provides a structured way to organize, manipulate, and analyze data using rows and columns.

Key features of Excel include:

- **Cells:** The intersection of a row and a column, where you enter data (numbers, text, formulas, etc.).
- **Rows and Columns:** The horizontal and vertical divisions of a spreadsheet, used to organize data.
- **Formulas:** Mathematical expressions that perform calculations on data within cells.
- **Functions:** Pre-defined formulas that automate common calculations.
- **Charts:** Visual representations of data to help analyse trends and patterns.

Basic Excel Concepts

- **Workbook:** A collection of worksheets.
- **Worksheet:** A single sheet within a workbook, where you enter and work with data.
- **Active Cell:** The currently selected cell in a worksheet.
- **Cell Address:** The unique identifier for a cell, consisting of a column letter and a row number (e.g., A1).
- **Data Types:** Different types of data that can be entered into cells, such as numbers, text, dates, and formulas.
- **Save Your Work:** Click on “File” and then “Save” to save your spreadsheet.
- **Closing Excel:** Click on the “X” button at the top-right corner of the Excel window.

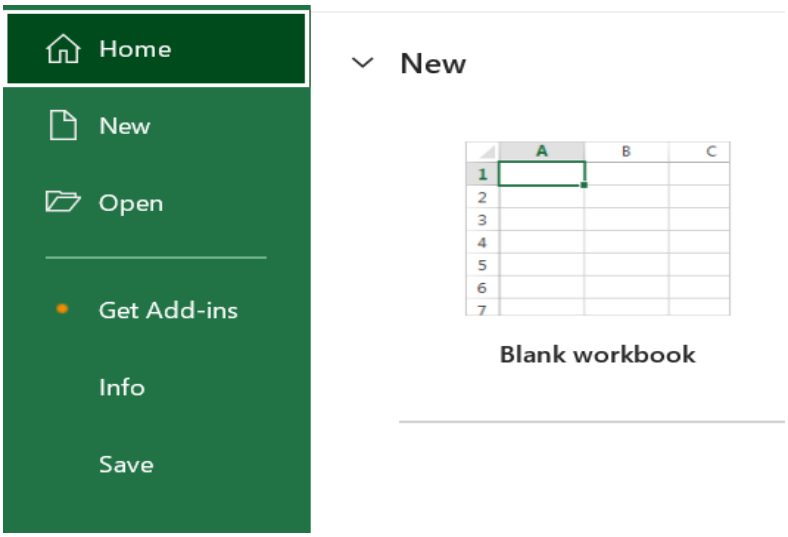
Experiment 1

Getting Started with Excel: Creation of spreadsheets, Insertion of rows and columns, Drag & Fill, use of Aggregate functions.

Objective: To gain a comprehensive understanding of the fundamental concepts of Excel, including creating spreadsheets, inserting rows and columns, utilizing drag and fill techniques, and applying aggregate functions to analyze data effectively.

Procedure:

1. **Creating a Spreadsheet:**
   - Open Microsoft Excel.
   - A new blank workbook will be created by default. This workbook contains multiple worksheets.
   - To create a new worksheet, click on the "+" button at the bottom of the worksheet tabs.



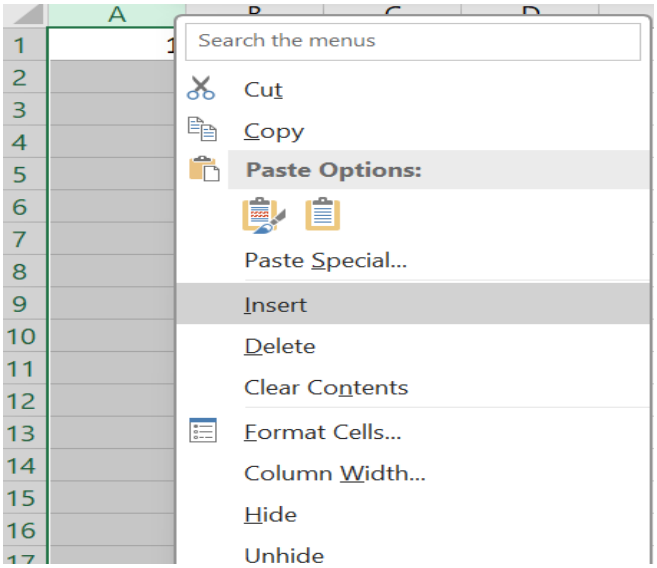
2. Insertion of rows and columns:

Understanding the Importance of Rows and Columns

In Excel, rows and columns form the fundamental structure of a spreadsheet. Rows run horizontally, numbered from top to bottom, while columns run vertically, labelled with letters from A to Z, and then AA, AB, and so on.

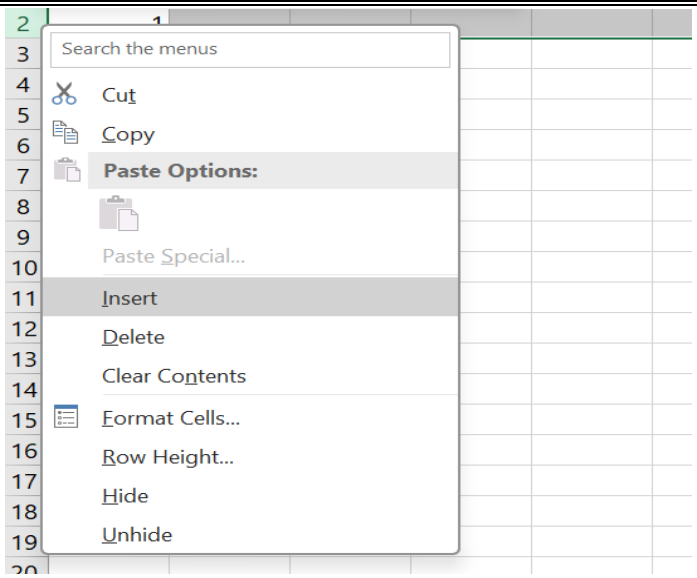
Inserting Row:

- **Right-click:** Click the right mouse button on the row number where you want to insert a new row. This will display a context menu.
- **Select "Insert":** Choose the "Insert" option from the context menu. A new row will be added above the selected row.



Inserting a Column:

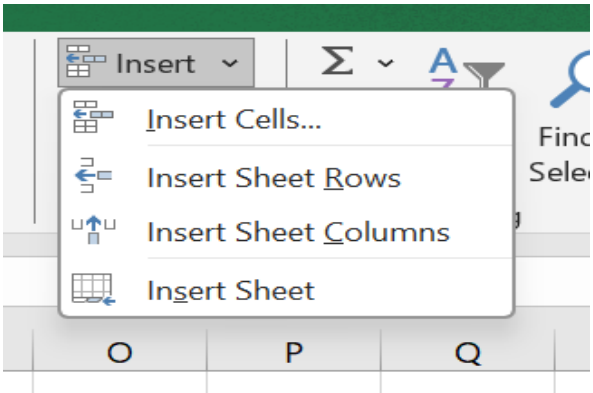
- **Right-click:** Click the right mouse button on the column letter where you want to insert a new column. This will display a context menu.
- **Select "Insert":** Choose the "Insert" option from the context menu. A new column will be added to the left of the selected column.



Additional Methods

Using the Ribbon:

- Navigate to the "Home" tab.
- In the "Cells" group, click the "Insert" button.
- Select "Insert Sheet Rows" or "Insert Sheet Columns" to add a row or column, respectively.



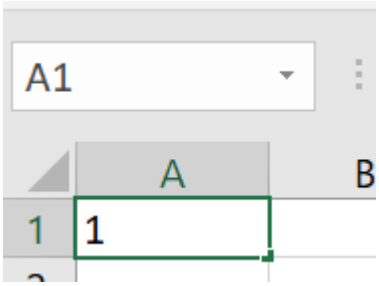
Keyboard Shortcuts:

- To insert a row, press Ctrl+Shift+Insert.
- To insert a column, press Ctrl+Shift+Space.

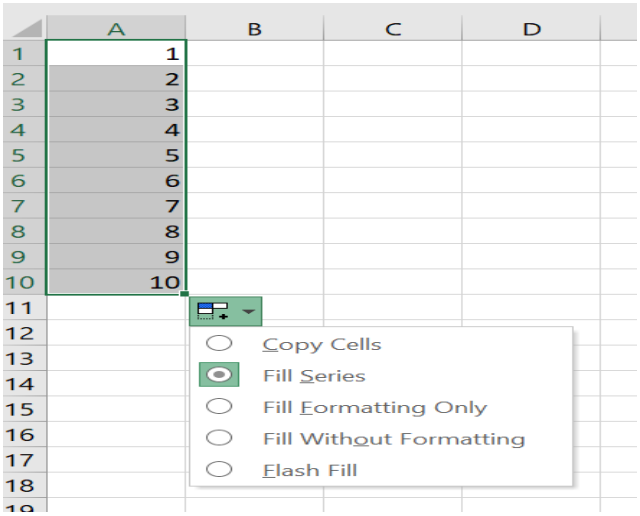
3. Drag and Fill

Filling Cells with Sequential Data:

- **Enter the starting value:** In cell A1, type the number you want to start the sequence with (e.g., 1).

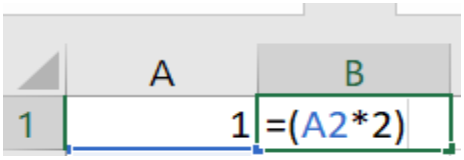


- **Drag the fill handle:** Click and hold the small square at the bottom-right corner of cell A1 (the fill handle, with black plus).
- **Extend the range:** Drag the fill handle down or to the right to the desired range (e.g., cells A1 to A10).
- **Observe the sequence:** Excel will automatically fill the selected cells with sequential numbers based on the starting value.



Copying Formulas:

1. **Enter a formula:** In a cell (e.g., B1), enter a formula (e.g., =A1*2 to double the value in cell A1).



2. **Drag the fill handle:** Click and hold the fill handle of the cell containing the formula.
3. **Extend the range:** Drag the fill handle down or to the right to the desired range (e.g., cells B1 to B10).
4. **Observe the formula adjustments:** Excel will copy the formula to the selected cells, adjusting the cell references as needed.

	A	B
1	1	2
2	2	4
3	3	6
4	4	8
5	5	10
6	6	12
7	7	14
8	8	16
9	9	18
10	10	20

4. Aggregate Functions:

Scenario:

Suppose you have a list of students' scores in a class, and you want to analyze the data using Excel's aggregate functions.

	A	B
1	**Student**	**Score**
2	Alice	85
3	Bob	78
4	Charlie	92
5	Diana	88
6	Edward	76

i. SUM Function:

Purpose: Adds up all the values in a selected range of cells.

How to Use:

- Select the cell where you want the result to appear.
- Type =SUM (, then select the range of cells you want to add.
- Close the parenthesis and press Enter.
- E.g. applying the sum function to the sample scenario data considered,
- **Instruction:** Type =SUM (B2:B6) in cell B7.
- **Result:** 419 (This is the sum of all the scores).

	A	B
1	**Student**	**Score**
2	Alice	85
3	Bob	78
4	Charlie	92
5	Diana	88
6	Edward	76
7		=SUM(B2:B6)

ii. AVERAGE Function:

Purpose: Calculates the average (mean) of a range of values.

How to Use:

- Select the cell where you want the average to be displayed.
- Type =AVERAGE (, then select the range of cells you want to calculate the average for.
- **C**lose the parenthesis and press Enter.
- Eg. applying the Average function to the sample scenario data considered.
- **Instruction:** Type =AVERAGE(B2:B6) in cell B8.
- **Result:** 83.8 (This is the average score of all students).

	A	B	C
1	**Student**	**Score**	
2	Alice	85	
3	Bob	78	
4	Charlie	92	
5	Diana	88	
6	Edward	76	
7		419	
8		=AVERAGE(B2:B6)	

iii. COUNT Function:

Purpose: Counts the number of cells that contain numerical data within a range.

How to Use:

- Select the cell where you want the count to appear.
- Type =COUNT(, then select the range of cells you want to count.
- Close the parenthesis and press Enter.
- E.g. applying the count function to the sample scenario data considered
- **Instruction:** Type =COUNT(B2:B6) in cell B9.
- **Result:** 5 (This counts the number of students).

	A	B	C
1	Student	Score	
2	Alice	85	
3	Bob	78	
4	Charlie	92	
5	Diana	88	
6	Edward	76	
7		419	
8		83.8	
9		=COUNT(B2:B6)	

iv. MAX Function:

Purpose: Finds the highest value in a range of cells.

How to Use:

- Select the cell where you want the maximum value to be displayed.
- Type =MAX(, then select the range of cells you want to analyze.
- Close the parenthesis and press Enter.
- E.g. applying the max function to the sample scenario data considered
- **Instruction:** Type =MAX(B2:B6) in cell B10.
- **Result:** 92 (This is the highest score among the students).

	A	B
1	Student	Score
2	Alice	85
3	Bob	78
4	Charlie	92
5	Diana	88
6	Edward	76
7		419
8		83.8
9		5
10		=MAX(B2:B6)

v. MIN Function:

Purpose: Finds the lowest value in a range of cells.

How to Use:

- Select the cell where you want the minimum value to appear.
- Type =MIN(, then select the range of cells you want to analyze.
- Close the parenthesis and press Enter.
- Eg. applying the minimum function to the sample scenario data considered
- **Instruction:** Type =MIN(B2:B6) in cell B11**.**
- **Result:** 76 (This is the lowest score among the students).

	A	B
1	Student	Score
2	Alice	85
3	Bob	78
4	Charlie	92
5	Diana	88
6	Edward	76
7		419
8		83.8
9		5
10		92
11		=MIN(B2:B6)

vi. MEDIAN Function:

Purpose: Finds the middle value in a range of numbers (i.e., the value that separates the higher half from the lower half).

How to Use:

- Select the cell where you want the median value to appear.
- Type =MEDIAN(, then select the range of cells.

- Close the parenthesis and press Enter.
- E.g. applying the median function to the sample scenario data considered
- **Instruction:** Type =MEDIAN(B2:B6) in cell B12.
- **Result:** 85 (Middle score in the list).

1	Student	Score
2	Alice	85
3	Bob	78
4	Charlie	92
5	Diana	88
6	Edward	76
7		419
8		83.8
9		5
10		92
11		76
12		=MEDIAN(B2:B6)

vii. MODE Function:

Purpose: Finds the most frequently occurring value in a range of numbers.

How to Use:

- Select the cell where you want the mode to appear.
- Type =MODE(, then select the range of cells.
- Close the parenthesis and press Enter.
- Eg. applying the mode function to the sample scenario data considered
- **Instruction:** Type =MODE(B2:B6) in cell B13.
- **Result:** If a score appears more than once, that score will be displayed; otherwise, it will show an error if all are unique.

1	Student	Score
2	Alice	85
3	Bob	78
4	Charlie	92
5	Diana	88
6	Edward	76
7		419
8		83.8
9		5
10		92
11		76
12		85
13		=MODE(B2:B6)

viii. STDEV (Standard Deviation):

Purpose: Calculates the standard deviation of a range of numbers, which measures how much the values deviate from the average.

How to Use:

- Select the cell where you want the standard deviation to appear.
- Type =STDEV(, then select the range of cells.
- Close the parenthesis and press Enter.
- **Instruction:** Type =STDEV(B2:B6) in cell B14.
- **Result:** This will give you the standard deviation of the scores.

	A	B
1	Student	Score
2	Alice	85
3	Bob	78
4	Charlie	92
5	Diana	88
6	Edward	76
7		419
8		83.8
9		5
10		92
11		76
12		85
13		
14		6.7231

Experiment 2

Importing Data, Data Entry & Manipulation, Sorting & Filtering.

Objective: To gain a comprehensive understanding of the process of importing data into Excel, entering and manipulating data effectively, and applying sorting and filtering techniques to extract relevant information.

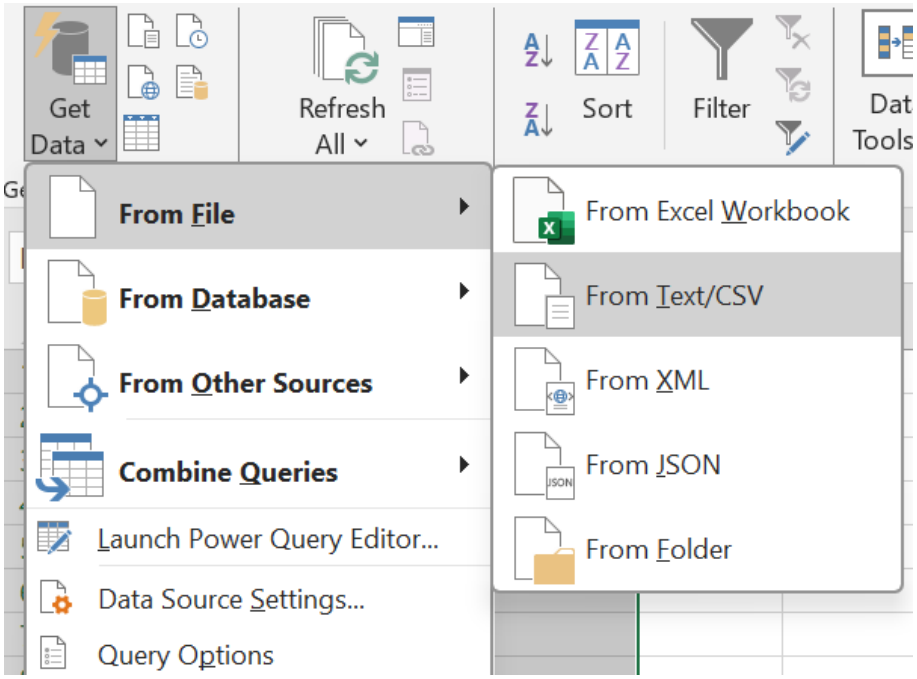
Procedure:

1. Importing Data:

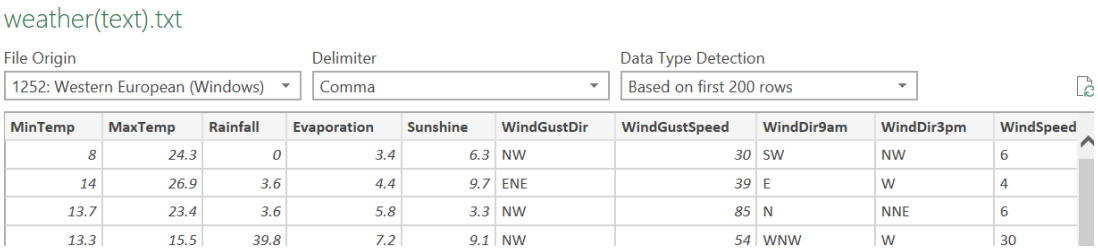
From a Text File:

- Navigate to the "Data" tab in the Excel ribbon.

- Click on "Get Data" and select "From Text/CSV".



- Choose the text file you want to import.
- Follow the wizard to specify the delimiter (e.g., comma, tab) and data type for each column.



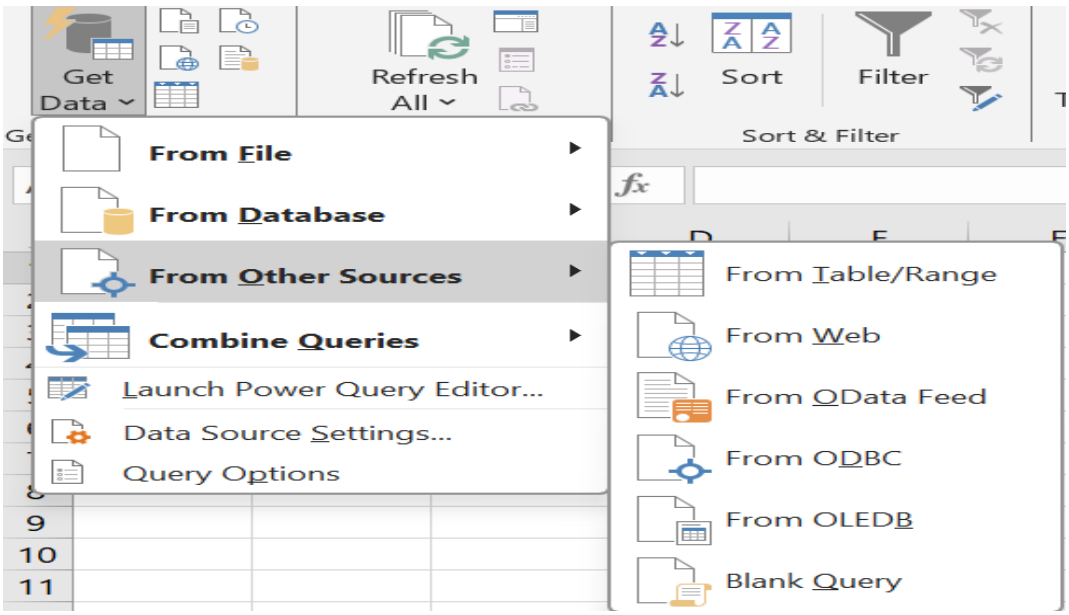
MinTemp	MaxTemp	Rainfall	Evaporation	Sunshine	WindGustDir	WindGustSpeed	WindDir9am	WindDir3pm	WindSpeed
8	24.3	0	3.4	6.3	NW	30	SW	NW	6
14	26.9	3.6	4.4	9.7	ENE	39	E	W	4
13.7	23.4	3.6	5.8	3.3	NW	85	N	NNE	6
13.3	15.5	39.8	7.2	9.1	NW	54	WNW	W	30

- Click "Load" to import the data into a new worksheet.

	A	B	C	D	E	F
1	MinTemp	MaxTemp	Rainfall	Evaporation	Sunshine	WindGustDir
2	8	24.3	0	3.4	6.3	NW
3	14	26.9	3.6	4.4	9.7	ENE
4	13.7	23.4	3.6	5.8	3.3	NW
5	13.3	15.5	39.8	7.2	9.1	NW

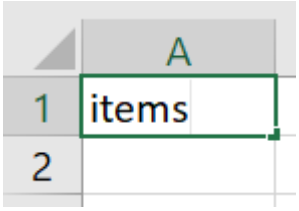
From Other Sources:

- Excel supports importing data from various sources, including other spreadsheets, databases, and web pages. Explore the "Get Data" options in the "Data" tab to find the appropriate method for your data source.

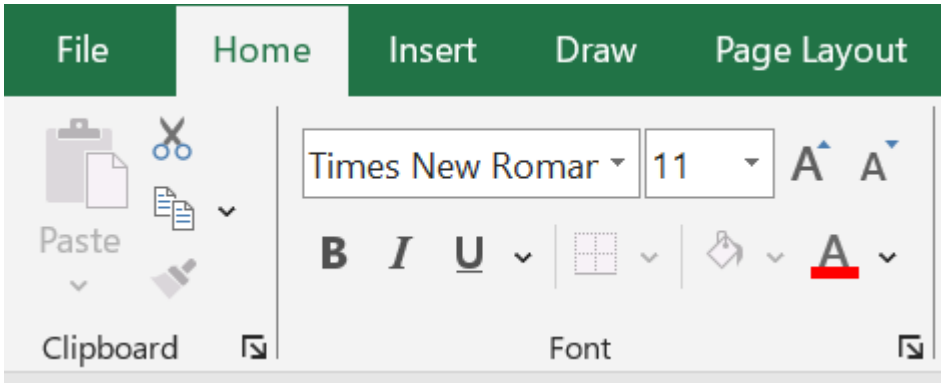


2. Data Entry and Manipulation:

- **Entering Data:**
  - Click on a cell and start typing.



  - Press Enter to move to the next cell.
  - Use the arrow keys to navigate between cells.
- **Basic Calculations:**
  - Utilize formulas to perform calculations on your data.
  - For example, to add two numbers in cells A1 and B1, enter =A1+B1 in cell C1.
- **Formatting:**
  - Apply formatting to your data to enhance readability and appearance.
  - Use the "Home" tab to change font, font size, alignment, number format, and more.



3. Sorting and Filtering:

- **Sorting:**
  - Select the range of data you want to sort.
  - Go to the "Data" tab and click on "Sort".
  - Choose the column by which you want to sort and the sort order (ascending or descending).
  - Click "OK" to sort the data.
- **Filtering:**
  - Select the range of data you want to filter.
  - Go to the "Data" tab and click on "Filter".
  - Small arrows will appear next to each column header.
  - Click on an arrow and select the criteria you want to filter by.

Consider you have a dataset of employees in an Excel spreadsheet.

	A	B	C	D
1	**Employee ID**	**Name**	**Department**	**Salary**
2	101	John Doe	Sales	50000
3	102	Jane Smith	Marketing	45000
4	103	Michael Johnson	HR	35000
5	104	Emily Brown	Finance	40000
6	105	David Lee	Sales	55000
7	106	Sarah Kim	Marketing	48000

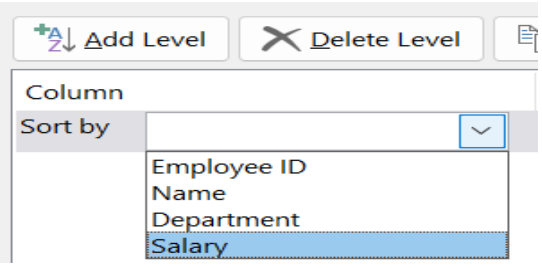
Sorting Example:

To sort this data by salary in descending order:

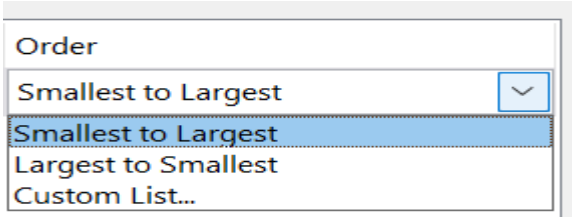
1. **Select the data:** Select the entire table (including headers) by placing white plus cursor at the bottom right corner of the first cell in the, drag till the end and release the cursor.

	A	B	C	D
1	Employee ID	Name	Department	Salary
2	103	Michael Johnson	HR	35000
3	104	Emily Brown	Finance	40000
4	102	Jane Smith	Marketing	45000
5	106	Sarah Kim	Marketing	48000
6	101	John Doe	Sales	50000
7	105	David Lee	Sales	55000
8				
9				

2. **Go to the "Data" tab:** Click on the "Data" tab in the Excel ribbon.
3. **Click "Sort":** Click on the "Sort" button in the "Sort & Filter" group.
4. **Choose the column:** In the "Sort by" dropdown, select "Salary".



5. **Choose the order:** Select "Smallest to Largest" for the "Order" option.

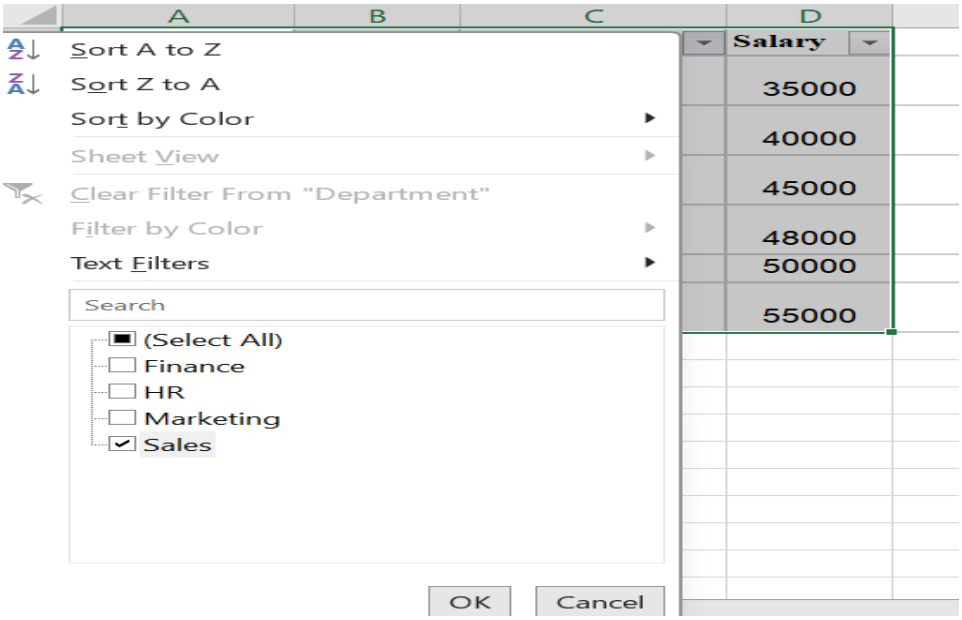


6. **Click "OK":** Click "OK" to apply the sort.

Filtering Example:

To filter the data to show only employees in the "Sales" department:

1. **Select the data:** Highlight the entire table (including headers).
2. **Go to the "Data" tab:** Click on the "Data" tab in the Excel ribbon.
3. **Click "Filter":** Click on the "Filter" button in the "Sort & Filter" group.
4. **Click the filter arrow:** Click on the arrow next to the "Department" column header.
5. **Select the criteria:** Uncheck "Select All" and check the "Sales" box.



6. **Click "OK":** Click "OK" to apply the filter.

1	Employee ID	Name	Department	Salary
6	101	John Doe	Sales	50000
7	105	David Lee	Sales	55000

Experiment 3

Working with Data: Data Validation, Pivot Tables & Pivot Charts.

Objective: To gain a comprehensive understanding of data validation techniques, and the creation and utilization of Pivot Tables and Pivot Charts for effective data analysis.

Procedure:

1. Data Validation:

Setting Data Validation Rules:

- Select the range of cells where you want to apply data validation.
- Go to the "Data" tab and click on "Data Validation".
- In the "Allow" dropdown, choose the type of data you want to allow (e.g., whole number, list, date).
- Set additional criteria as needed (e.g., minimum/maximum values, custom formulas).
- Click "OK" to apply the validation.

Creating Input Messages and Error Alerts:

- Customize the input message that appears when users enter data into the validated cells.
- Set up error alerts to provide feedback if users enter invalid data.

2. Pivot Tables:

Creating a Pivot Table:

- Select the range of data you want to analyze.
- Go to the "Insert" tab and click on "Pivot Table".
- Choose where you want to place the Pivot Table (new worksheet or existing worksheet).

- Click "OK".

Dragging Fields:

Drag fields from the "Fields" area to the "Rows", "Columns", "Values", and "Filters" areas to create different views of your data.

Calculating Values:

Use the "Values" area to calculate various metrics (e.g., sum, average, count, maximum, minimum).

3. Pivot Charts:

Creating a Pivot Chart:

- With your Pivot Table selected, go to the "Insert" tab and choose a chart type (e.g., bar chart, line chart, pie chart).
- Excel will automatically create a chart based on the data in your Pivot Table.

Customizing Charts:

Modify the chart elements (e.g., title, axis labels, legend) to suit your needs.

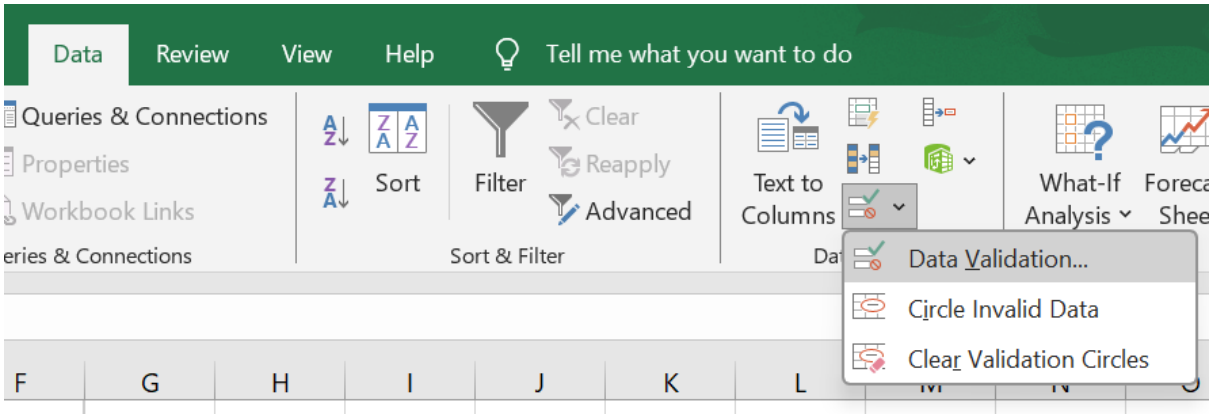
Consider you have a dataset of sales data:

	A	B	C	D	E
1	**Product**	**Quantity**	**Price**	**Date**	**Region**
2	Product A	10	20	01-01-2023	North
3	Product B	5	30	01-02-2023	South
4	Product A	8	20	01-03-2023	East
5	Product C	12	25	01-04-2023	West
6	Product B	7	30	01-05-2023	North
7	Product A	9	20	01-06-2023	South
8	Product C	15	25	01-07-2023	East
9	Product B	6	30	01-08-2023	West
10	Product A	11	20	01-09-2023	North
11	Product C	13	25	01-10-2023	South

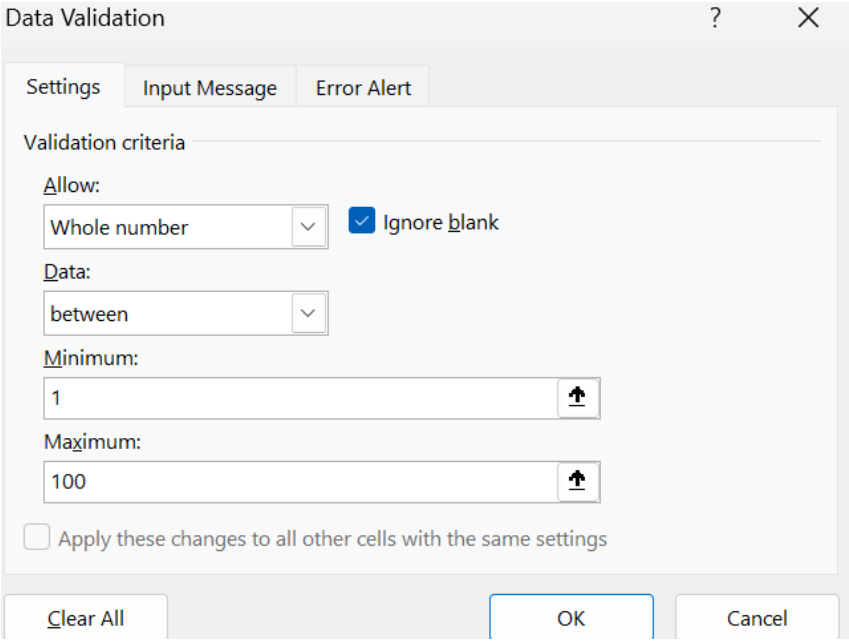
Data Validation Example:

To ensure that the "Quantity" column only contains whole numbers between 1 and 100:

1. **Select the range:** Select cell 1 to B11 (or the entire "Quantity" column).
2. **Go to "Data Validation":** Click on the "Data" tab and then "Data Validation".



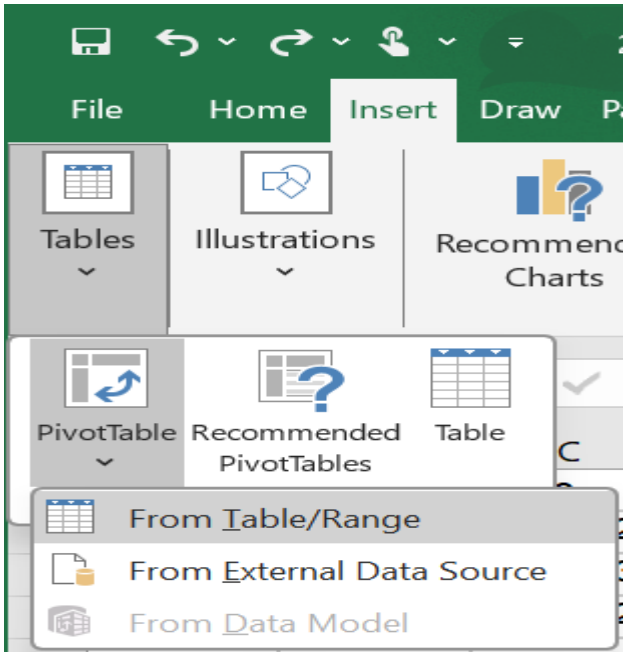
3. **Choose "Whole number":** In the "Allow" dropdown, select "Whole number".
4. **Set minimum and maximum:** Enter "1" in the "Minimum" field and "100" in the "Maximum" field.



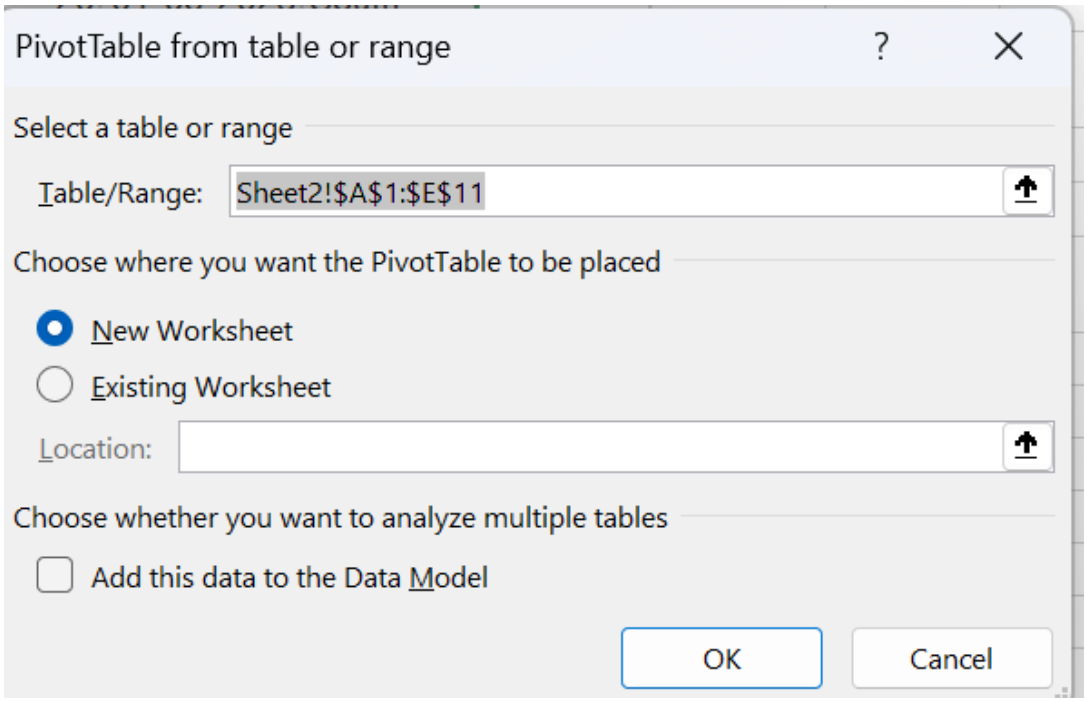
Pivot Table Example:

To create a Pivot Table to analyze sales by product and region:

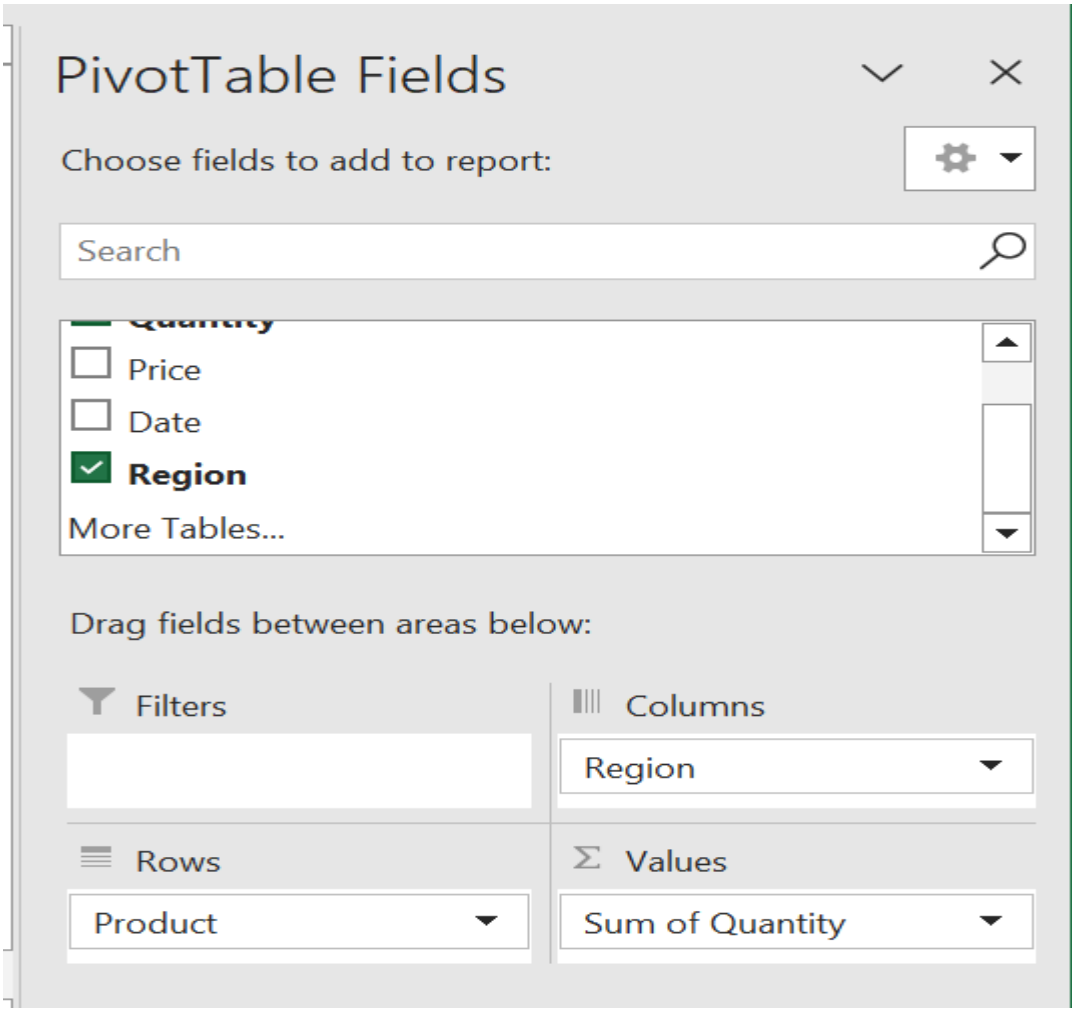
1. **Select the data:** Select the entire dataset.
2. **Insert a Pivot Table:** Go to the "Insert" tab and click "Pivot Table".



3. **Choose location:** Choose a location for the Pivot Table (e.g., a new worksheet).



4. **Drag fields:** Drag "Product" to the "Rows" area and "Region" to the "Columns" area.



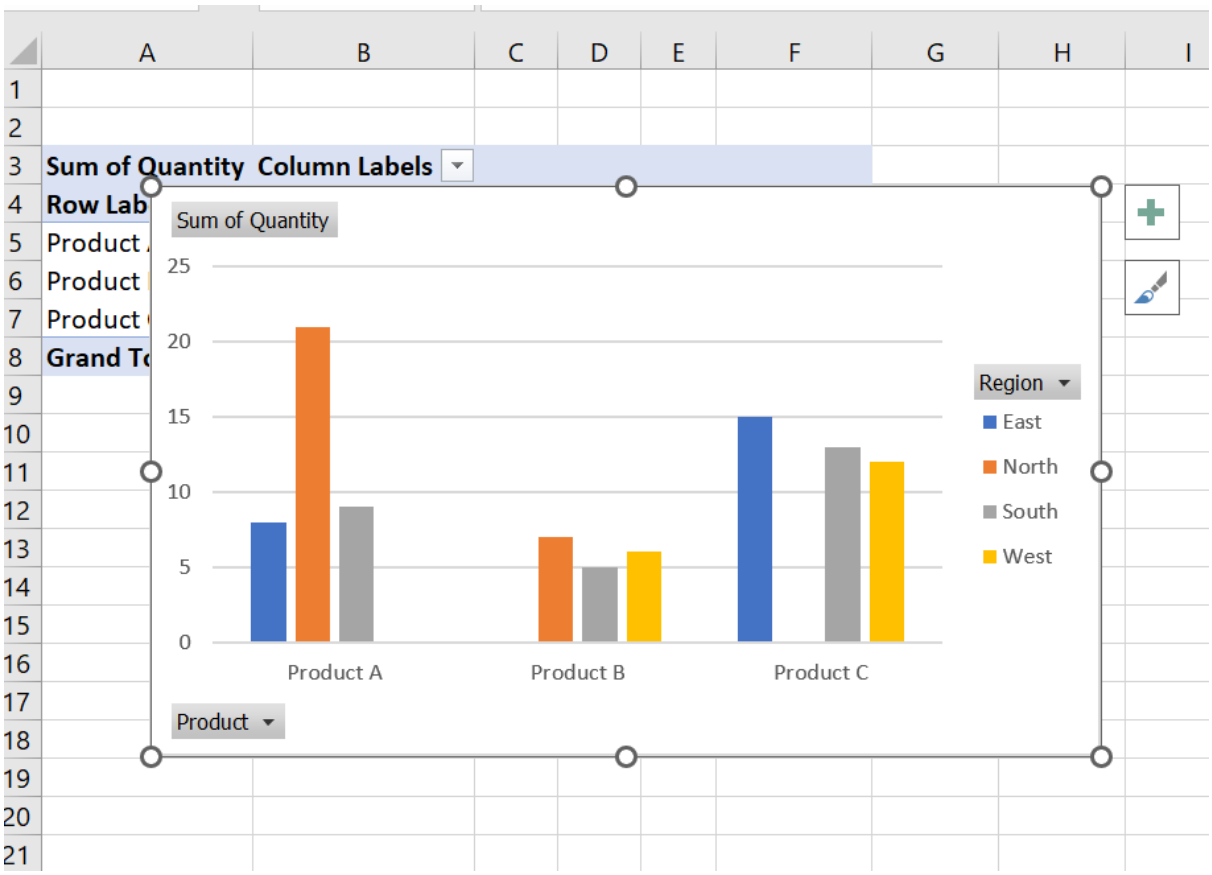
5. **Calculate values:** Drag "Quantity" to the "Values" area. Excel will automatically calculate the sum.

	A	B	C	D	E	F
1						
2						
3	**Sum of Quantity**	**Column Labels**				
4	**Row Labels**	**East**	**North**	**South**	**West**	**Grand Total**
5	Product A	8	21	9		38
6	Product B		7	5	6	18
7	Product C	15		13	12	40
8	**Grand Total**	**23**	**28**	**27**	**18**	**96**

Pivot Chart Example:

To create a bar chart based on the Pivot Table:

1. Select the Pivot Table: Click anywhere in the Pivot Table.
2. Insert a chart: Go to the "Insert" tab and choose a bar chart.



Experiment 4

Data Analysis Process: Conditional Formatting, What-If Analysis, Data Tables, Charts & Graphs.

Objective: To gain a comprehensive understanding of data analysis techniques, including conditional formatting, what-if analysis, data tables, and the creation of charts and graphs.

Procedure:

1. Conditional Formatting:

- **Highlighting Cells:**
  - Select the range of cells you want to format.
  - Go to the "Home" tab and click on "Conditional Formatting".
  - Choose a formatting rule (e.g., highlight cells rules, data bars, color scales).
  - Set the conditions for the formatting (e.g., greater than, less than, between).
  - Click "OK" to apply the formatting.
- **Customizing Formatting:**
  - Modify the formatting options (e.g., colors, fonts, patterns) to suit your needs.

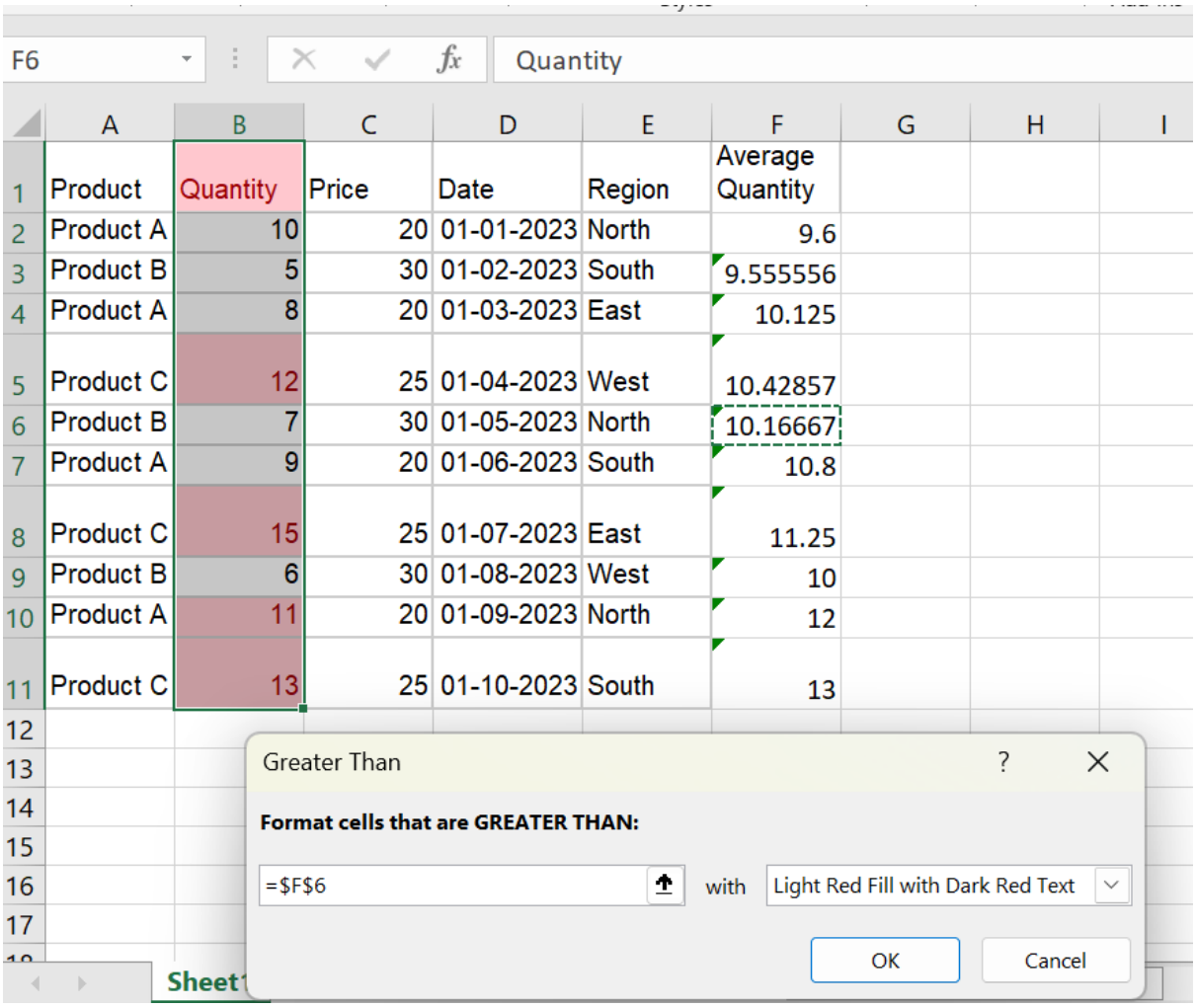
Consider you have a dataset of sales data:

	A	B	C	D	E
1	**Product**	**Quantity**	**Price**	**Date**	**Region**
2	Product A	10	20	01-01-2023	North
3	Product B	5	30	01-02-2023	South
4	Product A	8	20	01-03-2023	East
5	Product C	12	25	01-04-2023	West
6	Product B	7	30	01-05-2023	North
7	Product A	9	20	01-06-2023	South
8	Product C	15	25	01-07-2023	East
9	Product B	6	30	01-08-2023	West
10	Product A	11	20	01-09-2023	North
11	Product C	13	25	01-10-2023	South

To highlight products with sales above the average quantity:

1. **Calculate average quantity:** In cell F2, enter the formula =AVERAGE(B2:B11).
2. **Select data:** Select cells B2 to B11.

3. **Apply conditional formatting:** Go to "Home" -> "Conditional Formatting" -> "Highlight Cells Rules" -> "Greater Than".
4. **Set condition:** Enter the cell reference of the average quantity (e.g., F2) in the "Value" field.
5. **Choose formatting:** Select a desired format (e.g., Light red filled with dark red text).



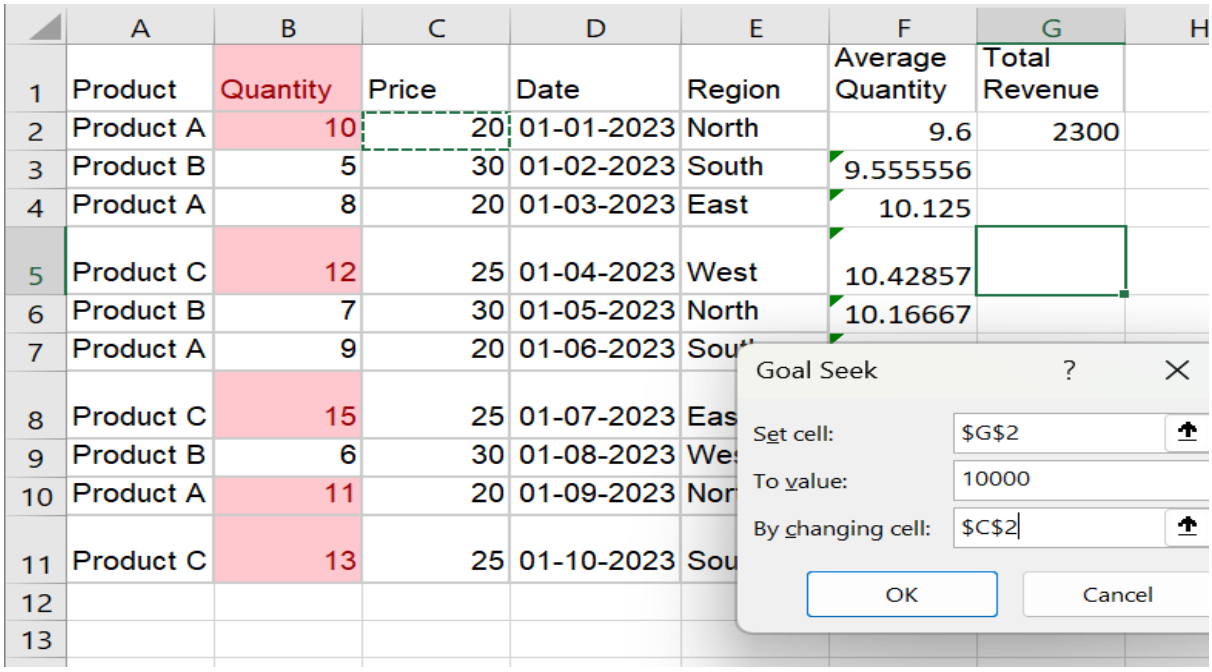
2. What-If Analysis:

- **Goal Seek:**
  - Set a target value for a cell.
  - Choose a cell that will be changed to reach the target.
  - Use the "Goal Seek" tool in the "Data" tab to find the value that will achieve the target.
- **Scenario Manager:**
  - Create multiple scenarios with different input values.
  - Switch between scenarios to see how changes in input values affect the output.

What-If Analysis Example:

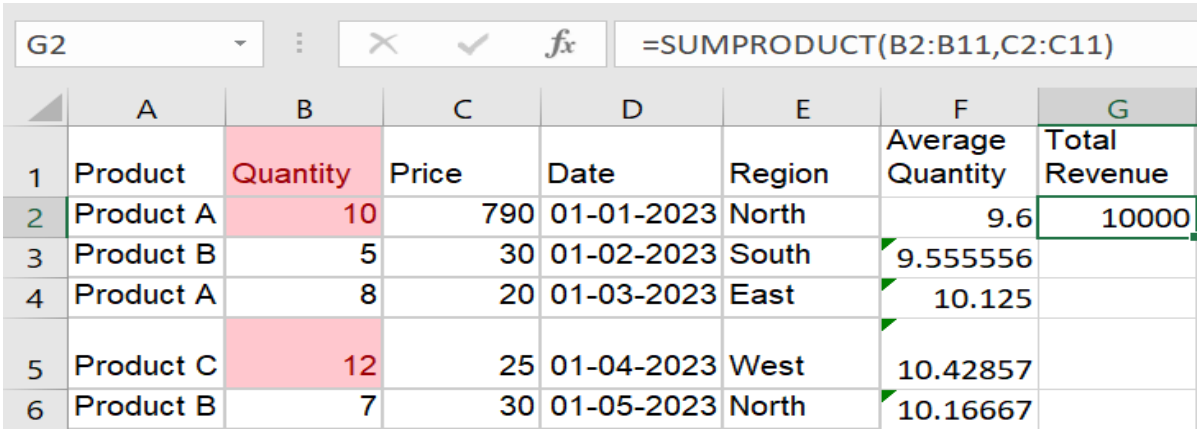
To determine the price increase needed to reach a total revenue of 10000:

1. **Calculate total revenue:** In cell G2, enter the formula =SUMPRODUCT(B2:B11, C2:C11) AND Drag it to fill all the cells in the column F.
2. **Set goal:** Go to "Data" -> "What-If Analysis" -> "Goal Seek".
3. **Set cell:** Enter the cell reference of total revenue (G2).
4. **Set value:** Enter "10000" in the "To value" field.
5. **By changing cell:** Enter the cell reference of a representative price (e.g., C2).



	A	B	C	D	E	F	G
1	Product	Quantity	Price	Date	Region	Average Quantity	Total Revenue
2	Product A	10	20	01-01-2023	North	9.6	2300
3	Product B	5	30	01-02-2023	South	9.555556	
4	Product A	8	20	01-03-2023	East	10.125	
5	Product C	12	25	01-04-2023	West	10.42857	
6	Product B	7	30	01-05-2023	North	10.16667	
7	Product A	9	20	01-06-2023	Sou		
8	Product C	15	25	01-07-2023	Eas		
9	Product B	6	30	01-08-2023	We		
10	Product A	11	20	01-09-2023	Nor		
11	Product C	13	25	01-10-2023	Sou		
12							
13							

6. **Click "OK":** Click "OK" to find the price increase.



G2 =SUMPRODUCT(B2:B11,C2:C11)

	A	B	C	D	E	F	G
1	Product	Quantity	Price	Date	Region	Average Quantity	Total Revenue
2	Product A	10	790	01-01-2023	North	9.6	10000
3	Product B	5	30	01-02-2023	South	9.555556	
4	Product A	8	20	01-03-2023	East	10.125	
5	Product C	12	25	01-04-2023	West	10.42857	
6	Product B	7	30	01-05-2023	North	10.16667	

3. Data Tables:

Data Tables: Tables make it easier to structure and organize data. Tables connect cells in a range and put it into a fixed structure.

The cells in the table range share the same formatting.

Tables can be used to prepare data for charts and pivot tables.

Tables allow for options such as:

• Sort & Filter

• Formatting

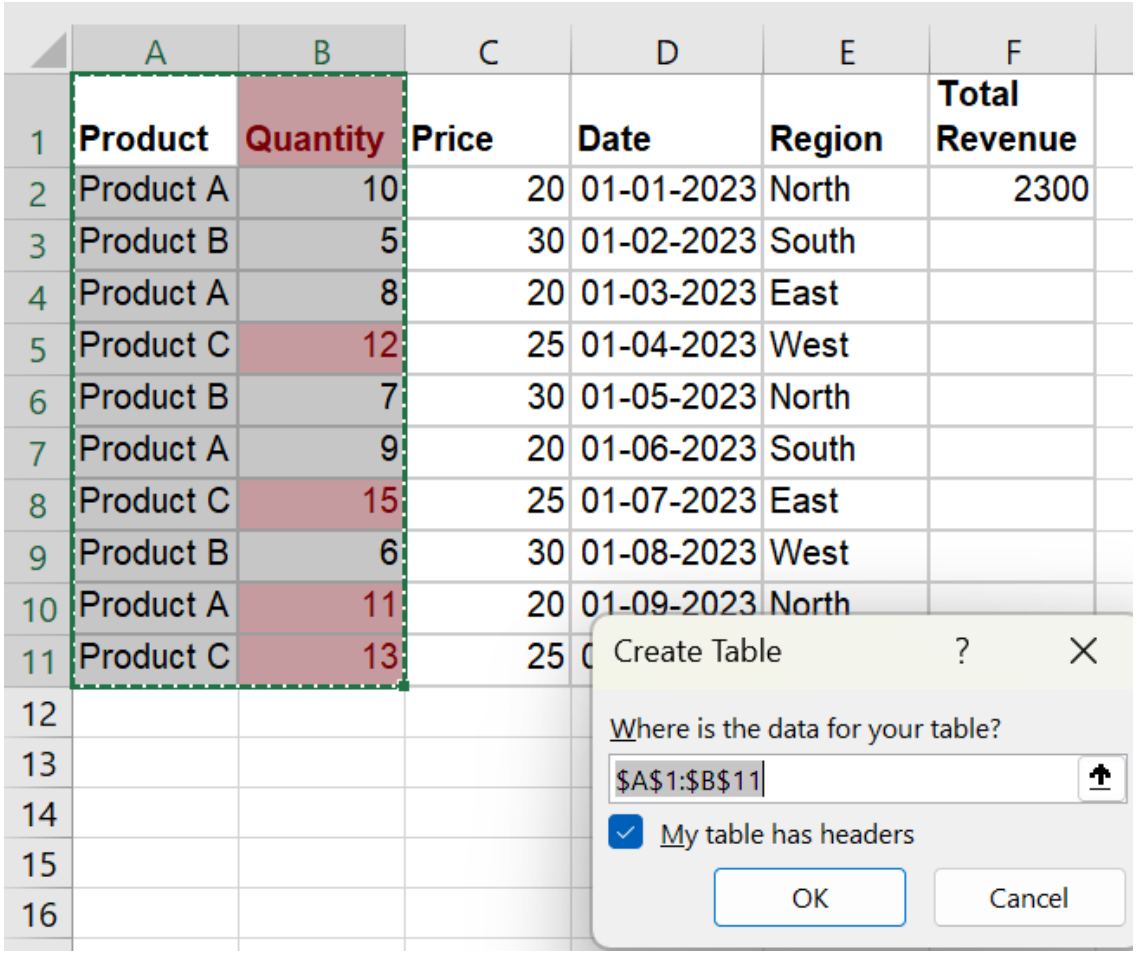
• Auto Filling

Ranges can be converted into tables. Tables can be converted back to range. There are many functions in Table like Table Design, Table Resizing, Remove Duplicates, Convert Table to Ranges, Table Style.

To convert Ranges into tables. First open the sheet.

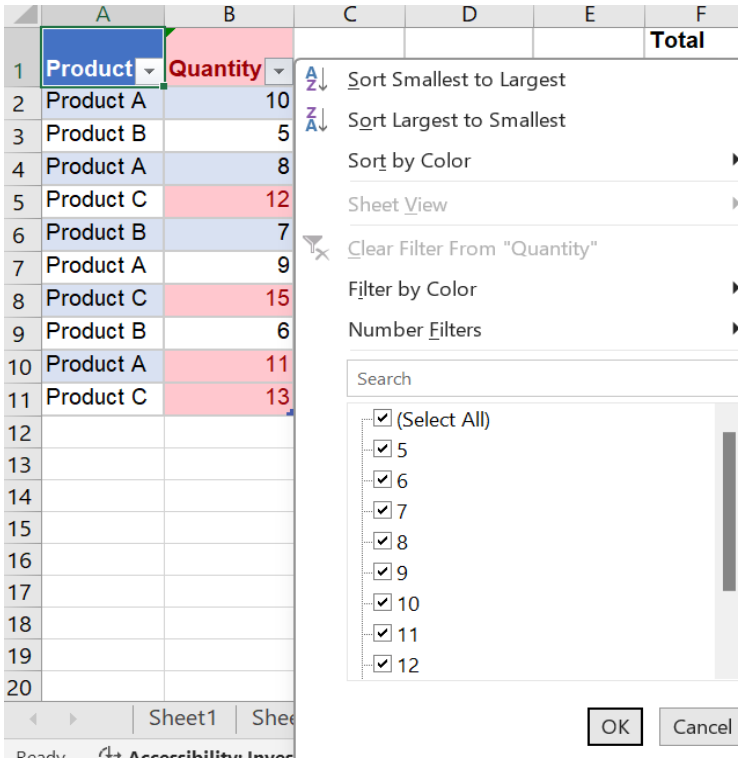
Select all the data of the sheet, to create a table

Click Insert, then Table in the Ribbon. Mark my table has headers if header is present in your file.



Product	Quantity	Price	Date	Region	Total Revenue
Product A	10	20	01-01-2023	North	2300
Product B	5	30	01-02-2023	South	
Product A	8	20	01-03-2023	East	
Product C	12	25	01-04-2023	West	
Product B	7	30	01-05-2023	North	
Product A	9	20	01-06-2023	South	
Product C	15	25	01-07-2023	East	
Product B	6	30	01-08-2023	West	
Product A	11	20	01-09-2023	North	
Product C	13	25			

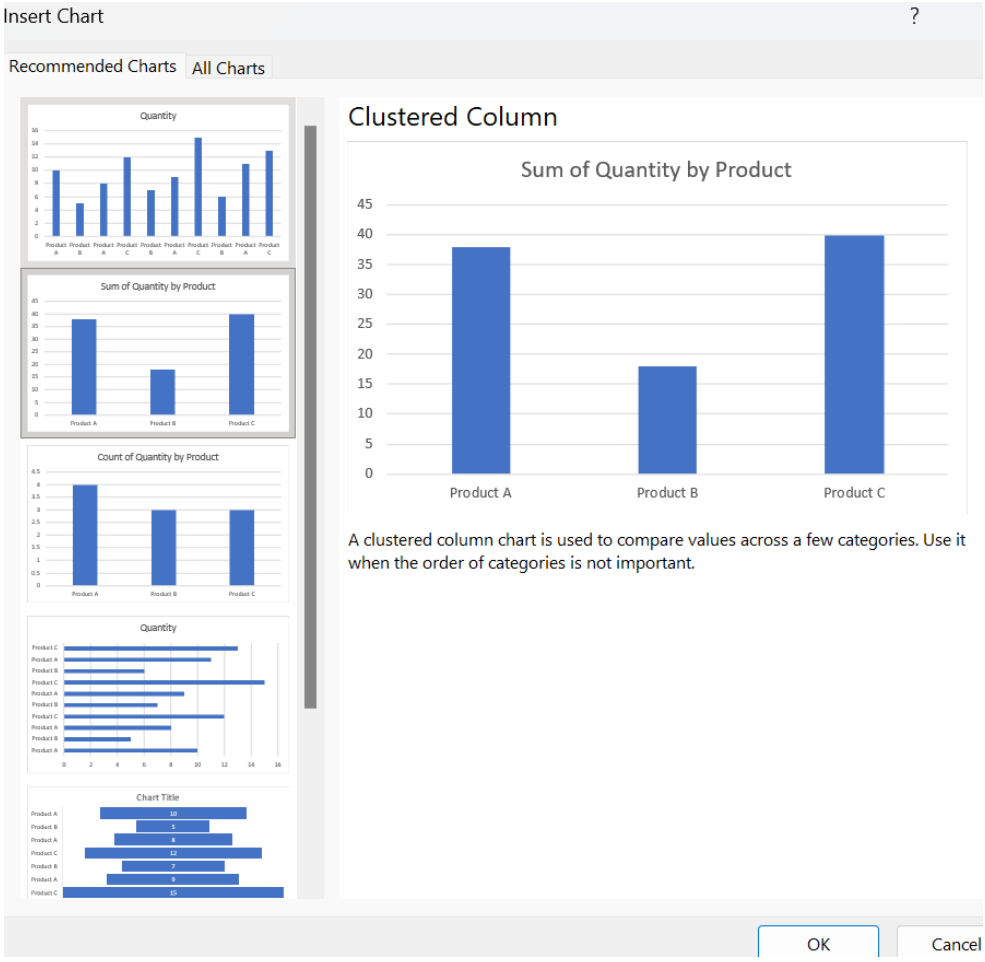
Ranges are converted into a Table with filter function.



Product	Quantity
Product A	10
Product B	5
Product A	8
Product C	12
Product B	7
Product A	9
Product C	15
Product B	6
Product A	11
Product C	13

4. Charts and Graphs:

- **Creating Charts:**
  - Select the data you want to chart.
  - Go to the "Insert" tab and choose a chart type (e.g., line chart, bar chart, pie chart).
  - Customize the chart elements (e.g., title, axis labels, legend).
- **Formatting Charts:**
  - Use the "Chart Tools" tab to modify the appearance of the chart.



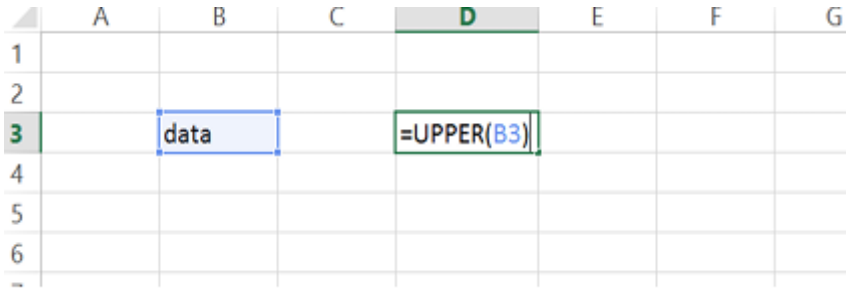
Experiment 5:

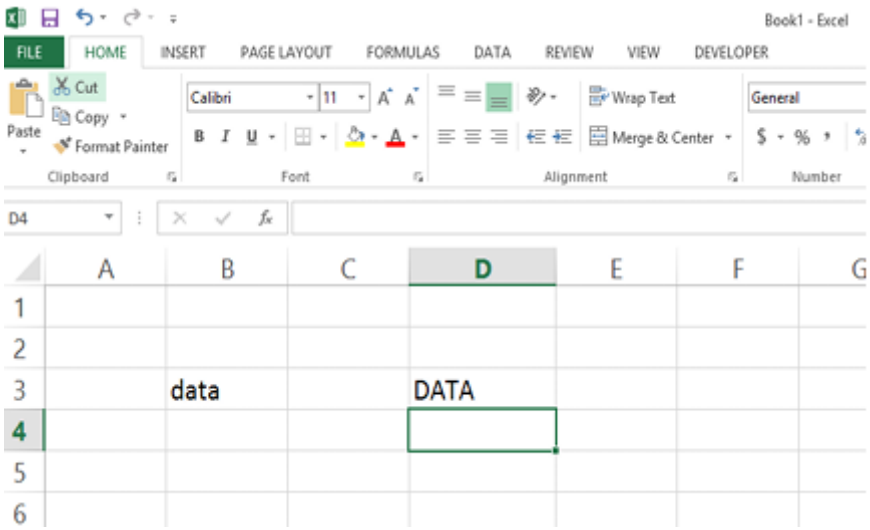
Cleaning Data with Text Functions use of UPPER and LOWER, TRIM function, Concatenate

Objective: To gain a comprehensive understanding of text functions in Excel and their application in data cleaning tasks.

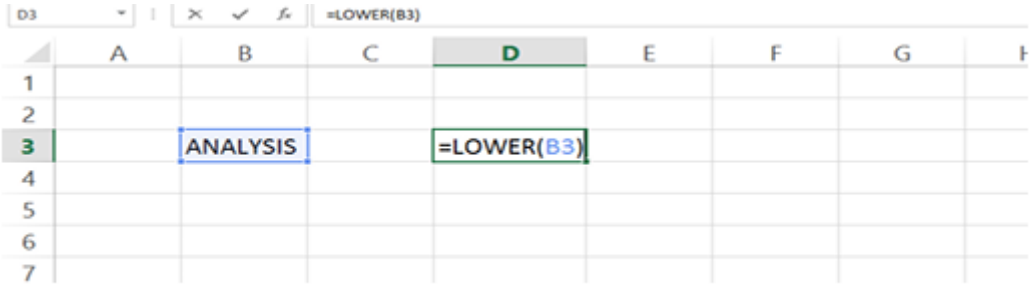
Procedure:

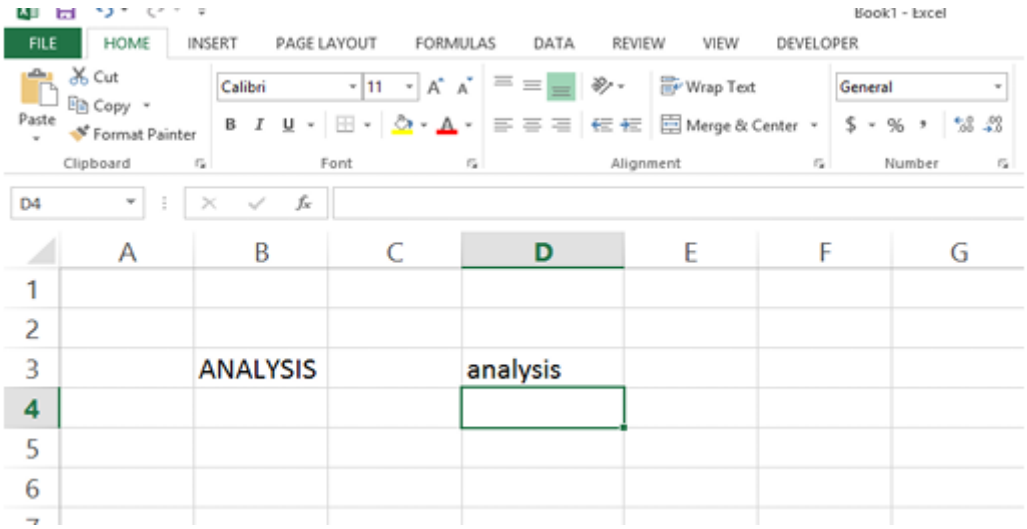
Use of UPPER: Select any cell, type =UPPER, provide the cell no. and then enter.





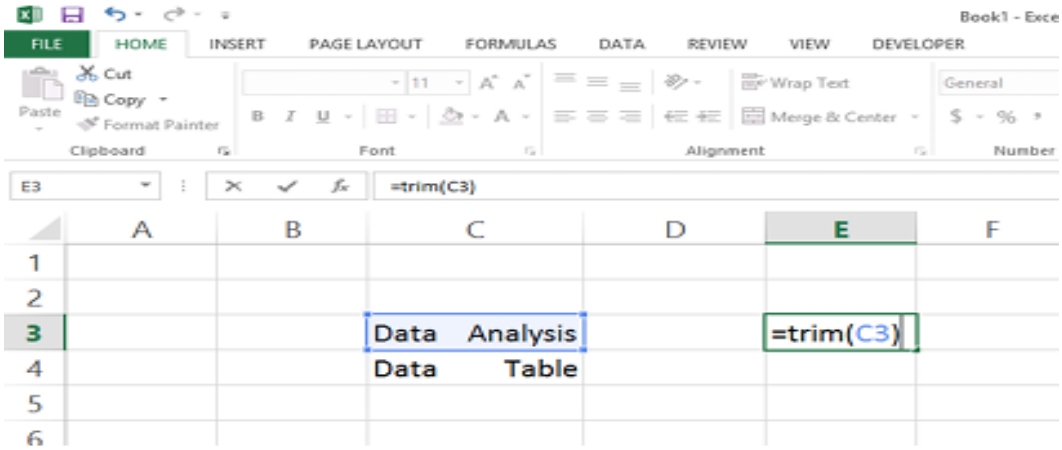
Use of LOWER: Select any cell, type =LOWER, provide the cell no. and then enter.

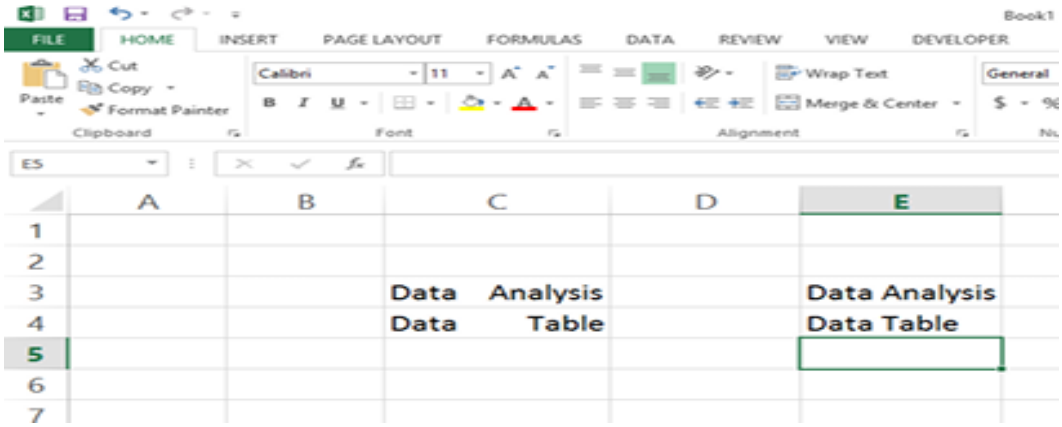




2. Use of TRIM Function:

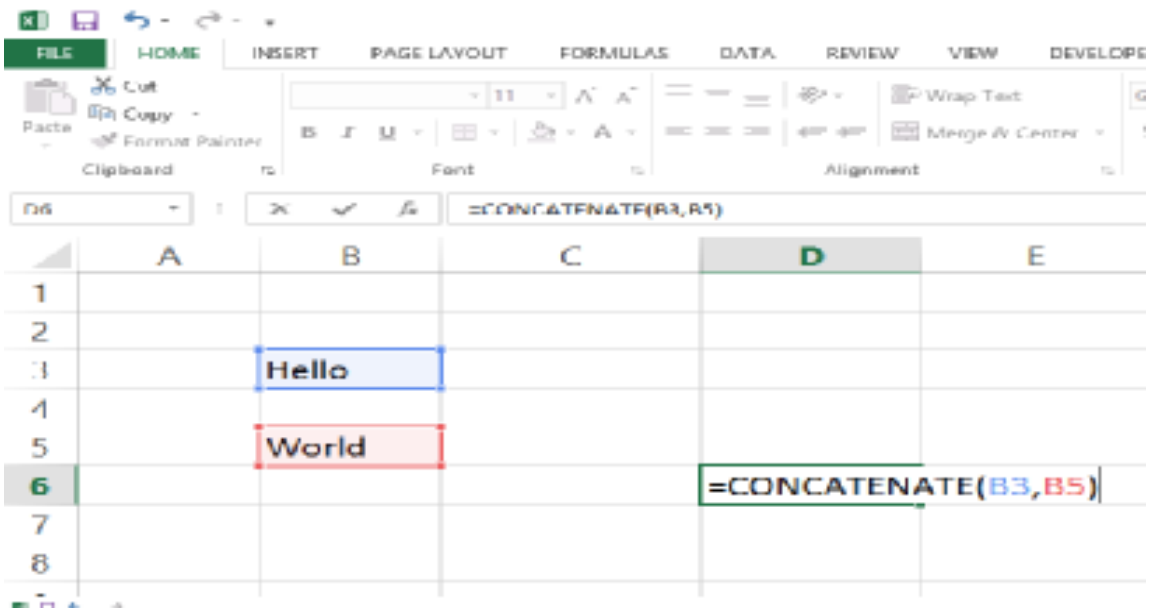
- Select the cell(s) where you want to delete spaces.
- Click the Trim Spaces button on the ribbon.
- Choose one or all of the following options: Trim leading and trailing spaces.
- Click Trim.

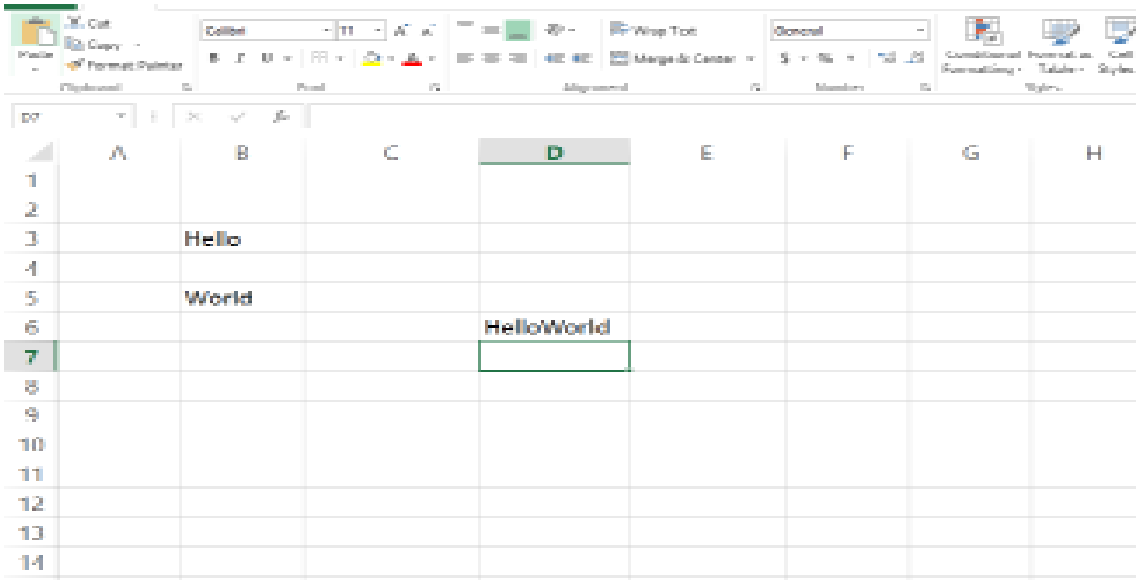




4. Use of Concatenate Function:

- Select the cell where you want to put the combined data.
- Type =CONCAT (.
- Select the cell you want to combine first. Use commas to separate the cells you are combining and use quotation marks to add spaces, commas, or other text.
- Close the formula with a parenthesis and press Enter.


FILE
HOME
INSERT
PAGE LAYOUT
FORMULAS
DATA
REVIEW
VIEW
Cut
Copy
Paste
Format Painter
Clipboard
Font
Alignment
Wrap Text
Merge & Center
=CONCATENATE(B3,B5)
Hello
World
=CONCATENATE(B3,B5)


Hello
World
HelloWorld

Experiment 6

Cleaning Data Containing Date and Time Values: use of DATEVALUE function, DATEADD and DATEDIF, TIMEVALUE functions.

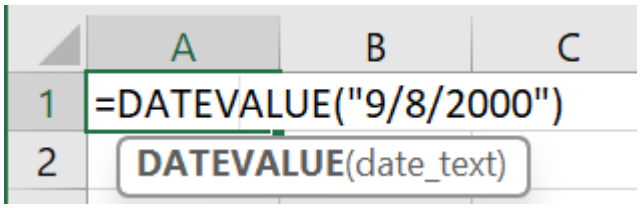
Objective: To gain a comprehensive understanding of date and time functions in Excel, and their application in data cleaning tasks.

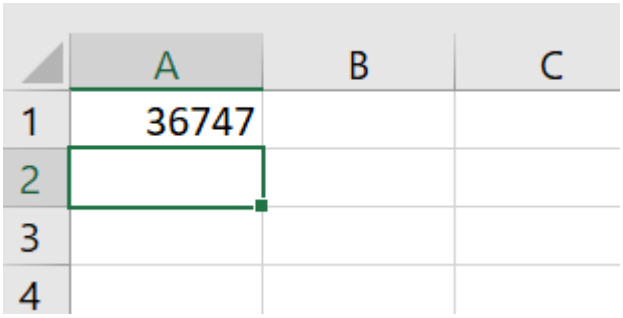
Procedure:

• The Excel DATEVALUE function converts a date represented as a text string into a valid Excel date.

• For example, the formula =DATEVALUE ("3/10/1975") returns a serial number (27463) in the Excel date system that represents March 10, 1975.

• Proper Excel dates are more useful than text dates since they can be directly manipulated with formulas and pivot tables.





2. Use of DATEADD Function:

• The DateAdd function to add or subtract a specified time interval from a date.

• For example, you can use DateAdd to calculate a date 30 days from today or a time 45 minutes from now.

• To add days to date, you can use Day of Year ("y"), Day ("d"), or Weekday ("w"). 31 DATA ANALYTICS WITH EXCEL LABORATORY MANUAL (BCS358A)

3. Use of DATEDIF Function:

• The Excel DATEDIF function returns the difference between two date values in years, months, or days.

• The DATEDIF (Date + Dif) function is a "compatibility" function that comes from Lotus 1-2-3.

• For reasons unknown, it is only documented in Excel 2000, but you can use it in your formulas in all Excel versions since that time.

4. Use of TIMEVALUE Function:

• The Excel TIMEVALUE function converts a time represented as text into a proper Excel time.

• For example, the formula =TIMEVALUE("9:00 AM") returns 0.375, the numeric representation of 9:00 AM in Excel's time system.

• Numeric time values are more useful than text since they can be directly manipulated with formulas and pivot tables.

Experiment 7

Conditional Formatting: formatting, parsing, and highlighting data in spreadsheets during data analysis.

1. Formatting:

It refers to the process of visually enhancing and organizing data within an Excel spreadsheet to improve its readability, clarity, and presentation.

This includes tasks like applying number formats, adjusting font styles and sizes, aligning text, using colors, borders, and charts, and overall structuring of the data for better analysis and reporting.

The goal of formatting is to make the data more accessible and understandable to analysts and decision-makers.

Create a worksheet with the following fields: Year, Month, Sales Amount, Expenses, Profit, Product Sold, Customer Count, and Region. Apply below formatting techniques to make the data more presentable.

A	B	C	D	E	F	G	H
Year	Month	Sales Amount	Expenses	Profit	Products Sold	Customer Count	Region
2021	January	5000	3000	2000	450	600	North
2021	February	6200	3500	2700	560	700	South
2021	March	7500	4000	3500	720	800	East
2021	April	6700	3200	3500	680	750	West
2021	May	8500	3800	4700	800	900	North
2021	June	7200	3400	3800	720	800	South
2021	July	9300	4200	5100	950	1000	East
2021	August	8900	4000	4900	880	950	West
2021	September	8100	3900	4200	800	900	North
2021	October	9500	4400	5100	960	1000	South
2021	November	8800	3900	4900	870	920	East
2021	December	10200	4600	5600	1000	1100	West

1.Number Formatting:

Apply appropriate number formatting to the “Sales Amount”“Expenses” and “Profit” columns. Select the cells in these columns, right-click, and choose "Format Cells." Format “Sales Amount” and “Expenses” as currency and “Profit” as a whole number.

2. Header Formatting:

Format the header row to make it visually distinct. You can bold the text, increase the font size, and use a different font color to emphasize the headers.

3. Alignment:

Right-align the “Sales Amount” and “Expenses” and “Profit” columns to enhance readability. Center-align the “Year” and “Month” column to make it visually appealing.

4.Borders:

Add borders to the table to separate it from the rest of the worksheet. Select the table, then click the "Borders" button (home -> font -> borders) and choose "All Borders."

The Formatted table is shown below

A	B	C	D	E	F	G	H
Year	Month	Sales Amount	Expenses	Profit	Products Sold	Customer Count	Region
2021	January	$5,000.00	$3,000.00	2000	450	600	North
2021	February	$6,200.00	$3,500.00	2700	560	700	South
2021	March	$7,500.00	$4,000.00	3500	720	800	East
2021	April	$6,700.00	$3,200.00	3500	680	750	West
2021	May	$8,500.00	$3,800.00	4700	800	900	North
2021	June	$7,200.00	$3,400.00	3800	720	800	South
2021	July	$9,300.00	$4,200.00	5100	950	1000	East
2021	August	$8,900.00	$4,000.00	4900	880	950	West
2021	September	$8,100.00	$3,900.00	4200	800	900	North
2021	October	$9,500.00	$4,400.00	5100	960	1000	South
2021	November	$8,800.00	$3,900.00	4900	870	920	East
2021	December	$10,200.00	$4,600.00	5600	1000	1100	West

This formatted table is now more reader-friendly, organized, and visually appealing for data analysis. Formatting the data in this way helps users quickly understand and interpret the information, making it suitable for data analytics with Excel.

2. Parsing:

Parsing in data analytics with Excel involves extracting specific information or elements from a text string, often for the purpose of data cleaning, transformation, or analysis. Parsing is particularly useful when working with unstructured or semi-structured data. Excel provides several functions and techniques for parsing data:

1.Text Functions:

• **LEFT, RIGHT AND MID**: These functions extract a specified number of characters from the left, right, or middle of a text string.

LEFT function

1. **Select the cell** where you want to place the extracted text.
2. **Type the formula** =LEFT(text,num_chars) and press Enter.
    - Replace text with the cell reference or text string that you want to parse.
    - Replace num_chars with the number of characters you want to extract from the left side of the text.

Example:

If you have "Hello, World!" in cell A2 and you want to extract the first 5 characters, you would use the formula =LEFT(A2,5). This would return "Hello".

RIGHT function

1. **Select the cell** where you want to place the extracted text.
2. **Type the formula** =RIGHT(text,num_chars) and press Enter.
    - Replace text with the cell reference or text string that you want to parse.
    - Replace num_chars with the number of characters you want to extract from the right side of the text.

Example:

If you have "Hello, World!" in cell A2 and you want to extract the last 6 characters, you would use the formula =RIGHT(A2,6). This would return "World!".

MID function

1. **Select the cell** where you want to place the extracted text.
2. **Type the formula** =MID(text,start_num,num_chars) and press Enter.
    - Replace text with the cell reference or text string that you want to parse.
    - Replace start_num with the starting position of the substring you want to extract (starting from 1).
    - Replace num_chars with the number of characters you want to extract.

Example:

If you have "Hello, World!" in cell A2 and you want to extract the characters between "Hello" and "World", you would use the formula =MID(A2,7,5). This would return ", Worl".

• **FIND and SEARCH**: These functions locate a specific character or substring within a text string. You can use them to find the position of a delimiter.

FIND Function

- **Purpose:** Locates the position of a specific character or substring within a text string, **case-sensitive**.
- **Syntax:** FIND(find_text, within_text, [start_num])
    - find_text: The text you want to find.
    - within_text: The text where you want to search.
    - start_num: (Optional) The position within within_text where you want to start searching. Defaults to 1.
- **Returns:** The position of the first occurrence of find_text within within_text. If not found, it returns an error (#VALUE!).

SEARCH Function

- **Purpose:** Similar to FIND, but **case-insensitive**.
- **Syntax:** SEARCH(find_text, within_text, [start_num])
- **Returns:** The position of the first occurrence of find_text within within_text, ignoring case.

Create a table with a column containing full addresses, and you want to parse this information into separate columns for street, city, state, and ZIP code.

	A
1	Address
2	123 Main St, Los Angeles, CA 90001
3	456 Elm Ave, New York, NY 10001
4	789 OAK Road, Chicago, IL 60601
5	101 Pine Dr, San Francisco, CA 94101

Now our goal is to parse the address data into separate columns for street, city, state, and ZIP code for above table

1. **Parsing Street address**: In a new column for "Street," you can use the formula to extract the street address: =LEFT (A2, FIND (",", A2) - 1) This formula locates the first comma (,) and extracts everything to the left of it.

DATEVALUE =LEFT(A2, FIND(",", A2) - 1)

	A	B
1	Address	Street
2	123 Main St, Los Angeles, CA 90001	=LEFT(A2, FIND(",", A2) - 1)
3	456 Elm Ave, New York, NY 10001	
4	789 OAK Road, Chicago, IL 60601	
5	101 Pine Dr, San Francisco, CA 94101	

2. Parsing City: In a new column for "City," you can use the formula to extract the city: =MID(A2, FIND(",", A2) + 2, FIND(",", A2, FIND(",", A2) + 1) - FIND(",", A2) - 2) This formula finds the second comma, then extracts the characters between the first and second comma (removing spaces) to get the city.

DATEVALUE =MID(A2, FIND(",", A2)+2, FIND(",", A2, FIND(",", A2)+1)-FIND(",",A2)-2)

	A	B	C
1	Address	Street	City
2	123 Main St, Los Angeles, CA 90001	123 Main St	=MID(A2, FIND(",", A2)+2, FIND(",", A2, FIND(",", A2)+1)-FIND(",",A2)-2)
3	456 Elm Ave, New York, NY 10001	456 Elm Ave	
4	789 OAK Road, Chicago, IL 60601	789 OAK Road	
5	101 Pine Dr, San Francisco, CA 94101	101 Pine Dr	
6			

3. Parsing State:

- In a new column for "State," you can use the formula to extract the state: =MID(A2, FIND(",", A2, FIND(",", A2) + 1) + 2, 2)

- This formula assumes that the state abbreviation is always two characters in length. It finds the second comma in the address, moves two characters to the right to start extracting the state, and takes the next two characters, which should represent the state abbreviation.

- This formula should work for most U.S. state abbreviations, as long as they are two characters in length.

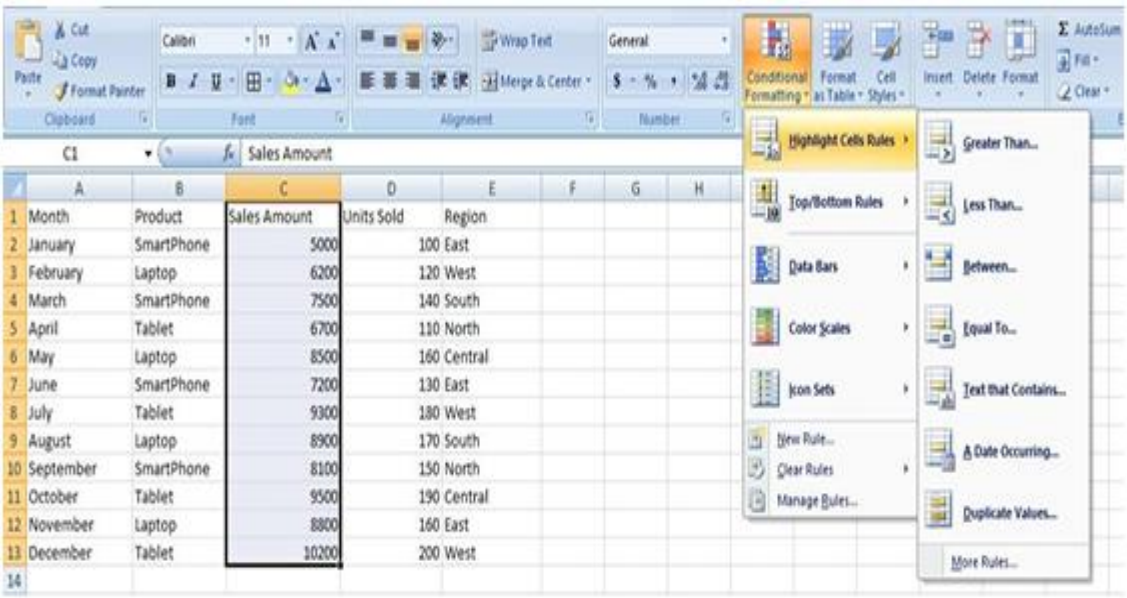
4. **Parsing ZIP Code**: To extract the zip code the following formula is used: =RIGHT(A2, 5)

	A	B	C	D	E
1	Address	Street	City	State	ZIP Code
2	123 Main St, Los Angeles, CA 90001	123 Main St	Los Angeles	CA	90001
3	456 Elm Ave, New York, NY 10001	456 Elm Ave	New York	NY	10001
4	789 OAK Road, Chicago, IL 60601	789 OAK Road	Chicago	IL	60601
5	101 Pine Dr, San Francisco, CA 94101	101 Pine Dr	San Francisco	CA	94101
6					

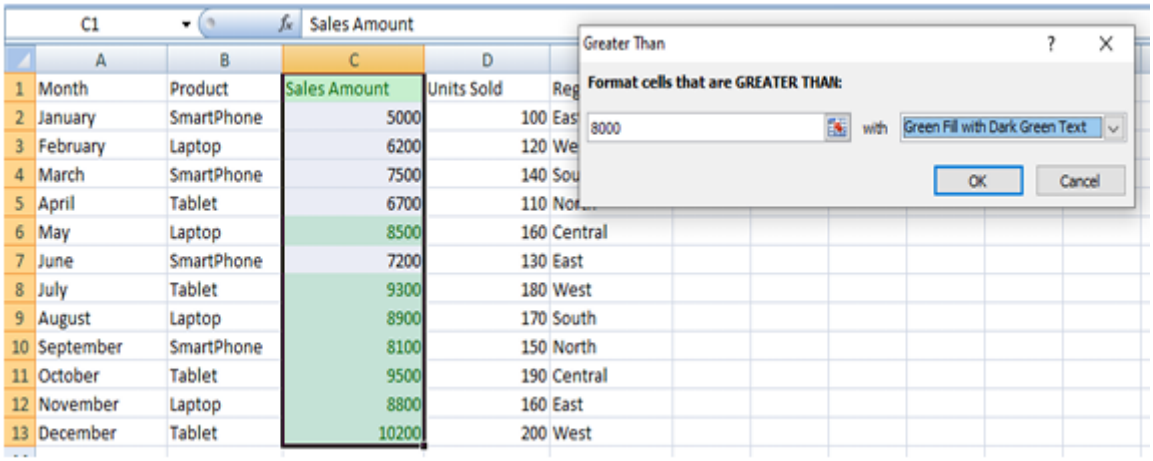
3. Highlighting data in spreadsheets during data analysis:

A	B	C	D	E
Month	Product	Sales Amount	Units Sold	Region
January	SmartPhone	5000	100	East
February	Laptop	6200	120	West
March	SmartPhone	7500	140	South
April	Tablet	6700	110	North
May	Laptop	8500	160	Central
June	SmartPhone	7200	130	East
July	Tablet	9300	180	West
August	Laptop	8900	170	South
September	SmartPhone	8100	150	North
October	Tablet	9500	190	Central
November	Laptop	8800	160	East
December	Tablet	10200	200	West

Step1: Select any column from the table. Here we are going to select a Sales Amount column. After that go to the home tab on the top of the ribbon and then in the styles group select conditional formatting and then in the highlight cells rule select Greater than an option.



Step 2: Then a greater than dialog box appears. Here first write the Sales Amount value and then select the color.



Step3: As you can see in the excel table Sales Amount column change the color of the values that are greater than 8000.

A	B	C	D	E
Month	Product	Sales Amount	Units Sold	Region
January	SmartPhone	5000	100	East
February	Laptop	6200	120	West
March	SmartPhone	7500	140	South
April	Tablet	6700	110	North
May	Laptop	8500	160	Central
June	SmartPhone	7200	130	East
July	Tablet	9300	180	West
August	Laptop	8900	170	South
September	SmartPhone	8100	150	North
October	Tablet	9500	190	Central
November	Laptop	8800	160	East
December	Tablet	10200	200	West

Experiment 8

Working with Multiple Sheets: work with multiple sheets within a workbook is crucial for organizing and managing data, perform complex calculations and create comprehensive reports.

Scenario: Construction project management task. You have data related to the project's budget, resource allocation, and task tracking that needs to be organized, analyzed, and reported on.

Step1: Data Entry

• Create a new Excel workbook for the project management.

• In the first sheet, label it "Budget," enter project expenses, allocations, and categories • In the second sheet, label it "Tasks," enter a list of project tasks, assigned team members, deadlines, and statuses.

• In the third sheet, label it "Reports," for generating summaries and charts.

1. Budget Sheet: Enter project expenses and allocations

Expense Category	Allocation (in $)
Labor	50000
Materials	30000
Equipment	20000
Miscellaneous	5000

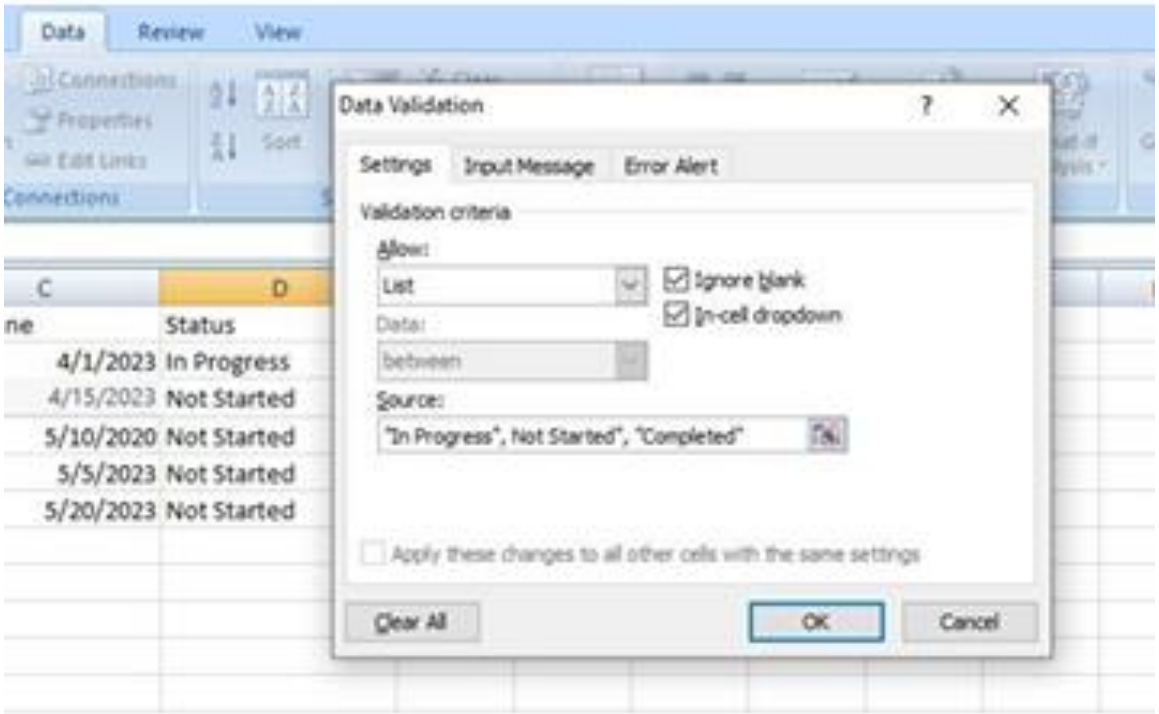
2. Task Sheet: Enter a list of project tasks, assigned team members, deadlines, and statuses

Task	Assigned To	Deadline	Status
Foundation	John	2023-04-01	In Progress
Framing	Sarah	2023-04-15	Not Started
Electrical	Mike	2023-05-10	Not Started
Plumbing	John	2023-05-05	Not Started
Finishing	Sarah	2023-05-20	Not Started

Step 2: Data Validation

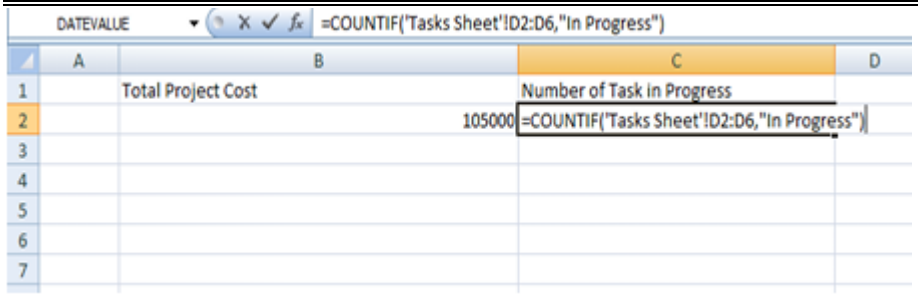
In the "Tasks" sheet, set up data validation for the "Status" column to allow only specific values:

- Select the "Status" column (e.g. from cell D2 to D6).
- Go to the "Data" tab in the Excel ribbon.
- Click on "Data Validation."
- In the "Data Validation" dialog box, choose "List" in the "Allow" field.
- In the "Source" field, enter the valid status values (e.g., "In Progress," "Not Started," "Completed").
- Click "OK."



Step 3: Linking Sheets

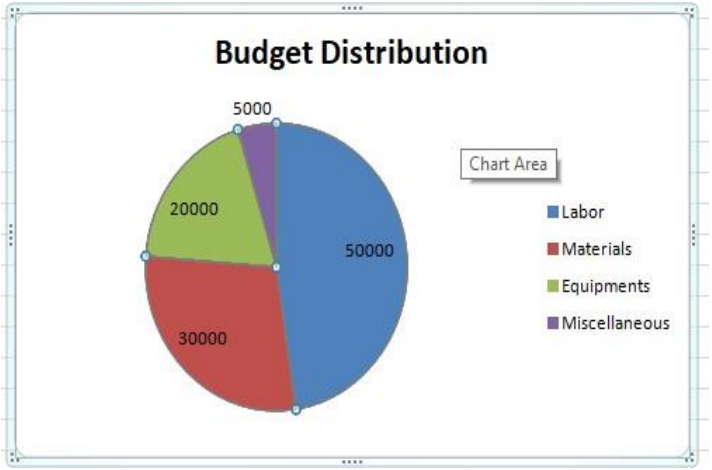
- In the third sheet, label it "Reports," use formulas to link and summarize data from the "Budget" and "Tasks" sheets.
- To calculate the total project cost in cell B2, you can use the formula: =SUM('Budget'!B2:B5)
- To calculate the number of tasks in progress in cell B4, you can use the formula: =COUNTIF('Tasks'!D2:D6, "In Progress")

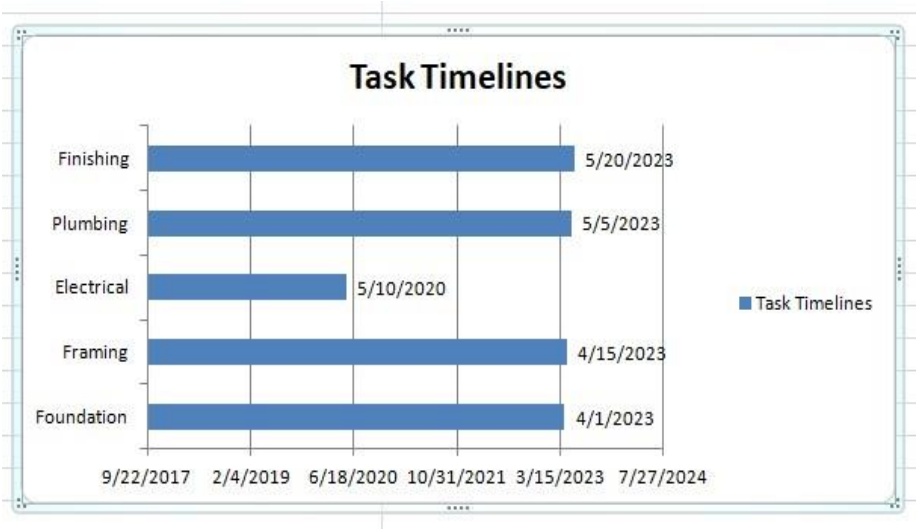


Step 4: Charts

In the "Reports" sheet, create charts to visualize project data:

- Forthe budget distribution, select the budget categories and allocations and create a pie chart.
- For task timelines, select the task names and deadlines and create a bar chart.
- A chart will be inserted into the selected cell
- The "Chart Tools" menu will appear in the Excel ribbon when the chart is selected.
- Under the "Design" tab in the "Chart Tools" menu, you'll find the "Select Data" option. Click on it.
- The "Select Data Source" dialog will appear. This dialog allows you to specify the data range for your chart.
- In the "Select Data Source" dialog, you can see the "Legend Entries (Series)" on the left.
- Here, you can add or edit data series (lines or bars on your chart).
- In the "Legend Entries (Series)" section, select the series you want to edit.
- In the "Edit Series" dialog on the right, you can change the series name and specify the data range.
- Click in the "Series values" field, and then go to the sheet (e.g., "Budget" or "Tasks") to select the data range. You can click and drag to select the cells with the data you want to include in the chart.
- Click Ok





Step 5: ComprehensiveReports

Project Summary:

1. Project Overview: In this project, we are undertaking the construction of a modern office facility, which will serve as our company's new headquarters.

- The project's primary goal is to create a state-of-the-art workplace that fosters collaboration and productivity among our employees.
- With a focus on sustainability and employee well-being, this project aims to provide an environmentally friendly and employee-centric workspace.
- It represents a significant milestone in our company's growth and commitment to a sustainable future.

2. Total Budget: =SUM(‘Budget Sheet’!B2:B5)=> 105000
3. Task In Progress: =COUNTIF(‘Task Sheet’!D2:D6, “In Progress”) => 1
4. Task Completed: =COUNTIF(‘Task Sheet’!D2:D6, “Completed”) => 0

Important Project Milestone:

- Project Kickoff Meeting(2023-01-15)
- Completion of foundation work(2023-04-01)
- Start of Framing (2023-04-15)
- Electrical Installation Commencement (2023-05-10)
- Plumbing Work Initiation (2023-05-05)
- Project Review Meeting (2023-06-01)

Project Insight

1. Budget Allocation: The budget is primarily allocated to labor and materials, indicating a strong focus on staffing and essential project resources.
    - This allocation strategy aligns with the project's resource-intensive nature and emphasizes the importance of skilled labor and quality materials in project success.
2. Project Progress: The project has achieved significant milestones on schedule, with the foundation work already in progress.
    - This progress demonstrates effective project management and strong team coordination.
    - It positions the project well for on-time delivery and successful execution.

Experiment 9

Create worksheet with following fields: Empno, Ename, Basic Pay (BP), Travelling Allowance (TA), Dearness Allowance (DA), House Rent Allowance (HRA), Income Tax (IT), Provident Fund (PF), and Net Pay (NP). Use appropriate formulas to calculate the above scenario. Analyze the data using appropriate chart and report the data

Step1: Table created

	A	B	C	D	E	F	G	H	I
1	Empno	Ename	Basic Pay(BP)	Travelling Allowance(TA)	Dearness Allowance(DA)	House Rent Allowance(HRA)	Income Tax(IT)	Provident Fund(PF)	Net Pay(NP)
2	101	John	50000	5000	7500	7000			
3	102	Alice	55000	5500	8250	7700			
4	103	Bob	60000	6000	9000	8400			
5	104	Sarah	48000	4800	7200	6720			
6	105	James	52000	5200	7800	7280			
7	106	David	62000	6200	9300	8680			
8	107	Emma	51000	5100	7650	7140			
9	108	Micheal	58000	5800	8700	8120			
10	109	Ethan	65000	6500	9750	9100			
11	110	Sophia	53000	5300	7950	7420			

Step2: Apply formulas

1. Income Tax (IT): You can use a simple formula to calculate income tax. Assuming a tax rate of 10%. In the cell for Income Tax of each employee, enter the formula: **"=0.10*(BP+TA+DA+HRA)"**

	A	B	C	D	E	F	G	H	I
1	Empno	Ename	Basic Pay(BP)	Travelling Allowance(TA)	Dearness Allowance(DA)	House Rent Allowance(HRA)	Income Tax(IT)	Provident Fund(PF)	Net Pay(NP)
2	101	John	50000	5000	7500	7000	=0.10 *(C2 + D2+E2+F2)		
3	102	Alice	55000	5500	8250	7700			
4	103	Bob	60000	6000	9000	8400			
5	104	Sarah	48000	4800	7200	6720			
6	105	James	52000	5200	7800	7280			
7	106	David	62000	6200	9300	8680			
8	107	Emma	51000	5100	7650	7140			
9	108	Micheal	58000	5800	8700	8120			
10	109	Ethan	65000	6500	9750	9100			
11	110	Sophia	53000	5300	7950	7420			

2.Provident Fund(PF): Assuming a PF rate of 8% . In the cell for Provident Fund of each employee, enter the formula: **"=0.08*(BP+TA+DA+HRA)"**

	A	B	C	D	E	F	G	H	I
1	Empno	Ename	Basic Pay(BP)	Travelling Allowance(TA)	Dearness Allowance(DA)	House Rent Allowance(HRA)	Income Tax(IT)	Provident Fund(PF)	Net Pay(NP)
2	101	John	50000	5000	7500	7000	6950	=0.08*(C2+D2+E2+F2)	
3	102	Alice	55000	5500	8250	7700			
4	103	Bob	60000	6000	9000	8400			
5	104	Sarah	48000	4800	7200	6720			
6	105	James	52000	5200	7800	7280			
7	106	David	62000	6200	9300	8680			
8	107	Emma	51000	5100	7650	7140			
9	108	Micheal	58000	5800	8700	8120			
10	109	Ethan	65000	6500	9750	9100			
11	110	Sophia	53000	5300	7950	7420			

3. Net Pay (NP): Net Pay is calculated by subtracting Income Tax and Provident Fund from the total earnings. In the cell for Net Pay of each employee, enter the formula: **"=(BP + TA + DA + HRA) - IT – PF"**

	A	B	C	D	E	F	G	H	I
1	Empno	Ename	Basic Pay(BP)	Travelling Allowance(TA)	Dearness Allowance(DA)	House Rent Allowance(HRA)	Income Tax(IT)	Provident Fund(PF)	Net Pay(NP)
2	101	John	50000	5000	7500	7000	6950	5560	=(C2+D2+E2+F2)-G2-H2
3	102	Alice	55000	5500	8250	7700			
4	103	Bob	60000	6000	9000	8400			
5	104	Sarah	48000	4800	7200	6720			
6	105	James	52000	5200	7800	7280			
7	106	David	62000	6200	9300	8680			
8	107	Emma	51000	5100	7650	7140			
9	108	Micheal	58000	5800	8700	8120			
10	109	Ethan	65000	6500	9750	9100			
11	110	Sophia	53000	5300	7950	7420			

Step3: Result

	A	B	C	D	E	F	G	H	I
1	Empno	Ename	Basic Pay(BP)	Travelling Allowance(TA)	Dearness Allowance(DA)	House Rent Allowance(HRA)	Income Tax(IT)	Provident Fund(PF)	Net Pay(NP)
2	101	John	50000	5000	7500	7000	6950	5560	56990
3	102	Alice	55000	5500	8250	7700	7645	6116	62689
4	103	Bob	60000	6000	9000	8400	8340	6672	68388
5	104	Sarah	48000	4800	7200	6720	6672	5337.6	54710.4
6	105	James	52000	5200	7800	7280	7228	5782.4	59269.6
7	106	David	62000	6200	9300	8680	8618	6894.4	70667.6
8	107	Emma	51000	5100	7650	7140	7089	5671.2	58129.8
9	108	Micheal	58000	5800	8700	8120	8062	6449.6	66108.4
10	109	Ethan	65000	6500	9750	9100	9035	7228	74087
11	110	Sophia	53000	5300	7950	7420	7367	5893.6	60409.4

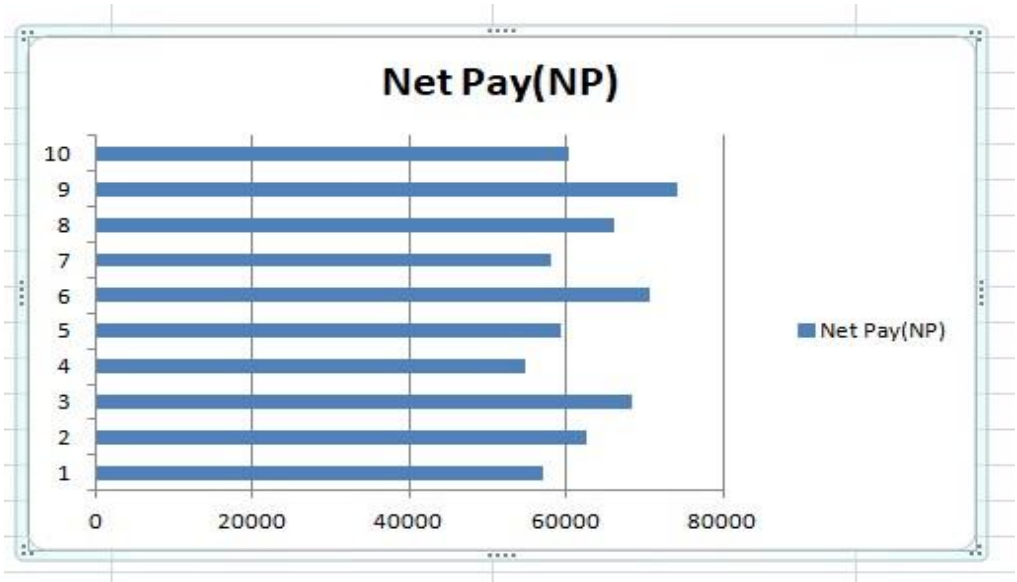
Step4: Analyze Data using chart

1 Highlight the Net Pay (NP) column for all employees.

2 Go to the "Insert" tab and select "Bar Chart" from the Charts group.

3 Choose the "Clustered Bar" chart style.

	A	B	C	D	E	F	G	H	I
1	Empno	Ename	Basic Pay(BP)	Travelling Allowance(TA)	Dearness Allowance(DA)	House Rent Allowance(HRA)	Income Tax(IT)	Provident Fund(PF)	Net Pay(NP)
2	101	John	50000	5000	7500	7000	6950	5560	56990
3	102	Alice	55000	5500	8250	7700	7645	6116	62689
4	103	Bob	60000	6000	9000	8400	8340	6672	68388
5	104	Sarah	48000	4800	7200	6720	6672	5337.6	54710.4
6	105	James	52000	5200	7800	7280	7228	5782.4	59269.6
7	106	David	62000	6200	9300	8680	8618	6894.4	70667.6
8	107	Emma	51000	5100	7650	7140	7089	5671.2	58129.8
9	108	Micheal	58000	5800	8700	8120	8062	6449.6	66108.4
10	109	Ethan	65000	6500	9750	9100	9035	7228	74087
11	110	Sophia	53000	5300	7950	7420	7367	5893.6	60409.4



Step 5: Report the data

- **Report Title:** Employees Monthly Payroll Analysis
- **Introduction:** The purpose of this report is to analyze monthly payroll data. This analysis aims to provide insights into the financial components of employee compensation, focusing on Income Tax, Provident Fund, and Net Pay. The data includes 10 employees and their respective earnings and deductions.
- **Summary of Key Metrics:**

  Total income tax paid: 77006.

  Total Provident Fund Deductions: 61604.8.

  Total Net Pay Distributed: 631449.2

- **Findings:**
  - Employee Ethan received the highest Net Pay, while Employee Sarah had the lowest, mainly due to variations in Basic Pay and deductions.
  - Employee Ethan having the highest deduction and Employee Sarah the lowest.
  - A trend emerged, showing that higher earners often faced larger deductions, emphasizing the importance of transparent payroll policies.

- **Conclusion:**

  The payroll analysis reveals variations in Net Pay based on income and deductions. It highlights the significance of clear communication regarding compensation components. To optimize payroll processes, regular tax policy reviews and consistent fund management are recommended, ensuring employee satisfaction and compliance.

Experiment 10

Create worksheet on Inventory Management: Sheet should contain Product code, Product name, Product type, MRP, Cost after % of discount, Date of purchase. Use appropriate formulas to calculate the above scenario. Analyse the data using appropriate chart and report the data. Step 1: Create a table

Product Code	Product Name	Product Type	MRP	Cost After Discount (%)	Date of Purchase
001	Smartphone	Electronics	100	Formula	2023-10-01
002	T-Shirt	Clothing	75	Formula	2023-10-05
003	Wall Art	Home Decor	120	Formula	2023-10-10
004	Tennis Racket	Sports Gear	50	Formula	2023-10-15
005	Digital Watch	Electronics	80	Formula	2023-10-20
006	Laptop	Electronics	150	Formula	2023-10-25
007	Coffee Table	Home Decor	110	Formula	2023-10-30
008	Jeans	Clothing	90	Formula	2023-11-02
009	Soccer Ball	Sports Gear	60	Formula	2023-11-05
010	Headphones	Electronics	70	Formula	2023-11-10

Step2: Apply Formulas

- For the "Cost After Discount (%)" column, you can apply the formula to calculate the cost after a certain percentage of discount. Assuming a 10% discount for each product
- In the "Cost After Discount (%)" column, you can use this formula for each product "=D2-(D2*0.10)"

DATEVALUE =D2 - (D2 * 0.10)

	A	B	C	D	E	F
1	ProductCode	ProductName	ProductType	MRP	Cost after % of discount	Date of Purchase
2	PCOO1	SmartPhone	Electronics	100	=D2 - (D2 * 0.10)	10/1/2023
3	PCOO2	T-Shirt	Clothing	75		10/5/2023
4	PCOO3	Wall Art	Home Decor	120		10/10/2023
5	PCOO4	Tennis Racket	Sports Gear	50		10/15/2023
6	PCOO5	Digital Watch	Electronics	80		10/20/2023
7	PCOO6	Laptop	Electronics	150		10/25/2023
8	PCOO7	Coffee Table	Home Decor	110		10/30/2023
9	PCOO8	Jeans	Clothing	90		11/2/2023
10	PCOO9	Soccer Ball	Sports Gear	60		11/5/2023
11	PCOO10	Headphones	Electronics	70		11/10/2023

Step3: Result

H13

	A	B	C	D	E	F
1	ProductCode	ProductName	ProductType	MRP	Cost after % of discount	Date of Purchase
2	PCOO1	SmartPhone	Electronics	100	90	10/1/2023
3	PCOO2	T-Shirt	Clothing	75	67.5	10/5/2023
4	PCOO3	Wall Art	Home Decor	120	108	10/10/2023
5	PCOO4	Tennis Racket	Sports Gear	50	45	10/15/2023
6	PCOO5	Digital Watch	Electronics	80	72	10/20/2023
7	PCOO6	Laptop	Electronics	150	135	10/25/2023
8	PCOO7	Coffee Table	Home Decor	110	99	10/30/2023
9	PCOO8	Jeans	Clothing	90	81	11/2/2023
10	PCOO9	Soccer Ball	Sports Gear	60	54	11/5/2023
11	PCOO10	Headphones	Electronics	70	63	11/10/2023

Step4: Plot a Chart

- Highlight the "Product Type" and "Cost After Discount (%)" columns for all products.
- Go to the "Insert" tab and select "Bar Chart" or "Column Chart" from the Charts group.
- Customize the chart as needed, adding labels and a title.

E14

	A	B	C	E	F
1	ProductCode	ProductName	ProductType	Cost after % of discount	Date of Purchase
2	PCOO1	SmartPhone	Electronics	90	10/1/2023
3	PCOO2	T-Shirt	Clothing	67.5	10/5/2023
4	PCOO3	Wall Art	Home Decor	108	10/10/2023
5	PCOO4	Tennis Racket	Sports Gear	45	10/15/2023
6	PCOO5	Digital Watch	Electronics	72	10/20/2023
7	PCOO6	Laptop	Electronics	135	10/25/2023
8	PCOO7	Coffee Table	Home Decor	99	10/30/2023
9	PCOO8	Jeans	Clothing	81	11/2/2023
10	PCOO9	Soccer Ball	Sports Gear	54	11/5/2023
11	PCOO10	Headphones	Electronics	63	11/10/2023

Step5: **Report the Data**

- **Report Title:** Inventory Management Report
- **Introduction:** The purpose of this report is to provide an overview of the current inventory management system.
- It aims to analyze key aspects of the inventory, including product details such as Product Code, Product Name, Product Type, Maximum Retail Price (MRP), and Cost after Discount, and Date of Purchase.
- This analysis will assist in evaluating inventory levels, tracking product data, and ensuring efficient management of stock. The report also includes a chart for visualizing the product distribution by type. The insights gained from this report can aid in making informed decisions regarding inventory control and procurement strategies.

- **Summary of Key Metrics**

  Total Products: 10

  Average cost after discount: 81.45 (=AVERAGE (E2:E11))

- **Finding:**

  The inventory exhibits a well-diversified product type distribution, with Electronics and Clothing being prominent.

  The average discounted cost is approximately $[average cost], providing a reference point for profitability assessment.

  Electronics and Clothing are the most popular product types, guiding procurement and marketing strategies.

- **Conclusion:**

  The analysis highlights well-balanced inventory management, with diversified product types and reasonable average discounted costs. Consistent procurement practices have maintained optimal stock levels. To further enhance efficiency, ongoing monitoring of product popularity and pricing strategies is recommended.

Experiment 11

Create worksheet on Sales analysis of Merchandise Store: data consisting of Order ID, Customer ID, Gender, age, date of order, month, online platform, Category of product, size, quantity, amount, shipping city and other details. Use of formula to segregate different categories and perform a comparative study using pivot tables and different sort of charts.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Order ID	Customer ID	Gender	age	date of order	month	online platform	Category of product	size	quantity	amount	shipping city	other details
2	1001	101	Male	35	1/10/2023	January	Website	Apparel	M	2	$100.00	New York	Gift wrapping requested
3	1002	102	Female	28	2/15/2023	February	Mobile App	Electronics	-	1	$200.00	Los Angeles	Special delivery time
4	1003	103	Male	45	3/20/2023	March	Website	Home Decor	-	3	$ 80.00	Chicago	Customer loyalty card
5	1004	104	Female	32	4/25/2023	April	In-Store	Apparel	S	4	$150.00	Houston	Gift message included
6	1005	105	Male	38	5/30/2023	May	Mobile App	Electronics	-	2	$250.00	Miami	Expedited shipping
7	1006	106	Female	29	6/5/2023	June	Website	Electronics	-	3	$180.00	Seattle	-
8	1007	107	Male	40	7/10/2023	July	In-Store	Home Decor	-	2	$ 90.00	Boston	Preferred customer
9	1008	108	Female	35	8/15/2023	August	Mobile App	Apparel	L	2	$120.00	San Francisco	-
10	1009	109	Male	30	9/20/2023	September	Website	Electronics	-	1	$300.00	Chicago	-
11	1010	110	Female	45	10/25/2023	October	Mobile App	Home Decor	-	3	$110.00	New York	-

Step2: use the below formula to segregate different Categories

"=SUMIFS([Amount],[Category of product], "Apparel")"

=SUMIFS(K:K,H:H,"Apparel")

	O
1	Total Sales By category
2	370
3	930
4	170
5	
6	
7	
8	

Step 3: Create a Pivot table for Comparative Analysis

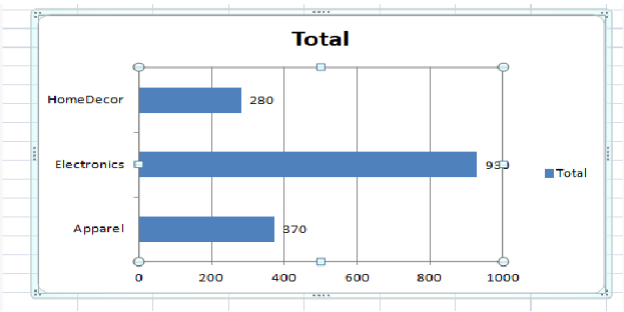
- Plotted the pivot table for Category of product and Amount field
- In the pivot table list drag the Category of product to the "Rows" area and Amount to the "Values" area to see the total amount per Category

Row Labels	Sum of amount
Apparel	370
Electronics	930
HomeDecor	280
Grand Total	**1580**

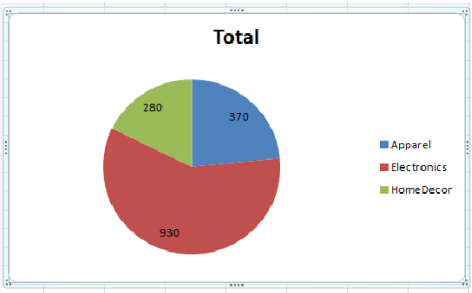
Step 4: Create a Different types of Charts

- Select a cell within your pivot table
- Go to insert tab and choose the type of a chart you want(eg: bar chart, pie chart etc) □ Customize the chart with titles, labels etc

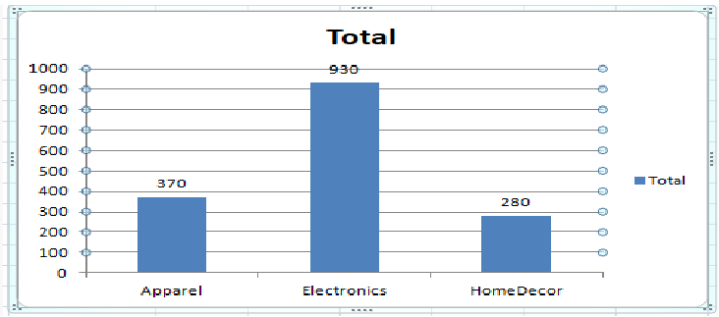
1. **Bar Chart**



2. **Pie Chart**



3. **Column Chart**



Experiment 12

Generation of report & presentation using Autofilter &macro.

Step 1: Prepare a table with Data

	A	B	C	
1	OrderId	Category of Products	Amount	
2	101	Apparel	$	100.00
3	102	Electronics	$	200.00
4	103	Apparel	$	150.00
5	104	HomeDecor	$	90.00
6	105	Electronics	$	110.00
7	106	Books	$	220.00
8	107	Sports Equipment	$	300.00
9	108	Books	$	350.00
10	109	Apparel	$	200.00
11	110	Sports Equipment	$	120.00

Step 2: Apply AutoFilter

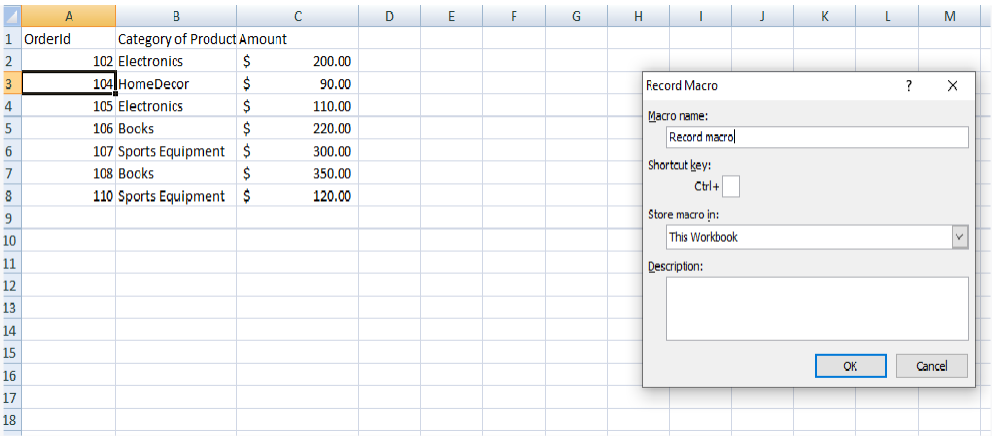
- Select your data range.
- Go to the 'Data' tab in Excel.
- Click on 'Filter' or 'Sort & Filter' to enable Autofilter options.
- Use Autofilter to filter the data as needed, e.g., filter for a specific category.

OrderI	Category of Products	Amount	
102	Electronics	$	200.00
104	HomeDecor	$	90.00
105	Electronics	$	110.00
106	Books	$	220.00
107	Sports Equipment	$	300.00
108	Books	$	350.00
110	Sports Equipment	$	120.00

Step 3: Record a Macro

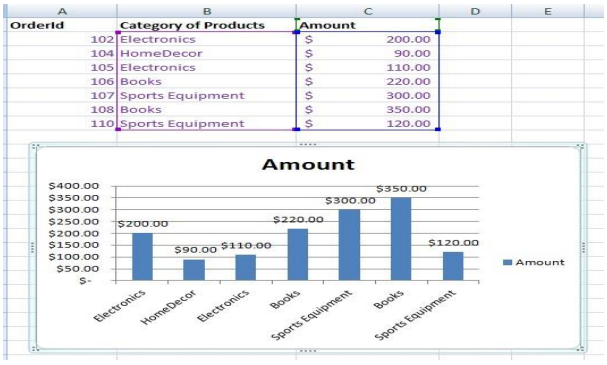
- Go to the "View" tab in Excel.
- Click on "Macros" and choose "Record Macro."
- In the "Record Macro" dialog box, provide a name for your macro, e.g., "GenerateReport."

- In the "Store macro in" dropdown, select "This Workbook" to save the macro within your workbook.
- Click "OK" to start recording.



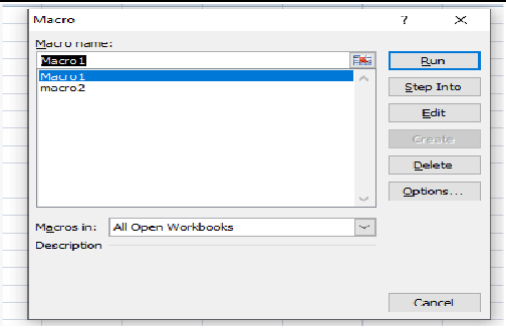
Step 4: Create a Report Manually

- While the macro is recording, manually copy the filtered data by selecting it and pressing Ctrl + C.
- Open a new sheet.
- Manually paste the copied data using Ctrl + V.
- Format the data, add titles, and structure it as you like to create a report. □ Manually create charts to visualize the data.



Step 5: Stop Recording a Macro

- Go to the "View" tab in Excel.
- Click on "Macros" and choose "Stop Recording."



For Generating a presentation

Step 6: Create a presentation manually

- Open Microsoft PowerPoint Create a new presentation.
- Copy the content from your report (the filtered data, text, and charts).
- Create slides for your presentation and paste the content onto the slides.
- Format the slides, add titles, and organize the content in a presentation format manually.
- Save the presentation