Spreadsheet

- Software package that works with data on the sheet
- used for storing data, creating table, chart, using formula and performing other data related tasks
- Some popular spreadsheet software
  - Microsoft Excel, StarOffice/OpenOffice Calc, Lotus 1-2-3, Ouattro Pro, PlanMaker
- Spreadsheet program by Microsoft Corporation
- Extension of MS Excel Workbook:
  - .xls (2003 and earlier), .xlsx (2007 and later)
- Workbook template extension:
  - .xlt (2003 and earlier), .xltx (2007 and later)

MS Excel: Overview

- **Workbook**: Excel file- Collection of worksheet
- **Worksheet**: Collection of rows and columns (default: 3)
- **Row**: Long horizontal rectangular box
  - No of rows: 65,536 (2003)/ 10,48,576 (2007)
- **Column**: Long vertical rectangular box
  - No of columns: 256:IV (2003)/ 16,384:XFD (2007)
- **Cell**: intersection of row and column
  - Cell address or cell reference is represented by column label and row number (e.g. A5)
- **Active cell**: cell that is clicked
  - Cell address of active cell is displayed in name box

MS Excel: Overview

- **Sheet Tab**: tab that is used to display the worksheet currently being edited (sheet 1/ sheet 2/ sheet 3)
- **Name box:** Box which displays cell address
- **Formula bar**: the bar which displays formula or content (value) of active cell
  - Formula bar has *enter, cancel and insert function* buttons
- **Tab scroll bar:** located at bottom left corner allows to view additional sheet tabs
- **Fill Handle**: Thin + symbol appear at bottom right corner of cell, used to fill data in cells dragging downwards

MS Excel: Overview

- **Default alignment**: general→number - *right*, text - *left*
- **Maximum size of data a cell can hold**: 32767 bytes (characters)
- **Default row height**: 12.75 pt (2003), 15 pt (2007) **max**: 409 pt
- **Default Column width**: 8.43 char **max**: 255 char
- **Default font and size:** Arial 10 (2003), Calibri 11 (2007 and other)
- Hold 'Shift' Key to select cell range or group of adjacent cells.
- Hold 'Ctrl' key to select multiple non-adjacent cells

MS Excel

Excel data type

- 1. **Value (Number):** All the numeric values (0-9)
- 2. **Label (Text):** Alphanumeric value. Numeric value can be changed to label with apostrophe (') at the beginning.
- 3. **Formula:** All formulae that start with equal to (=) sign

  [Note: values taken by formula for calculation are known as parameter (arguments)

  e.g. =SUM(A2, B2), here A2 and B2 are parameters (arguments)]
- 4. **Date/Time**: Contains date and time.

MS Excel

Format Cell dialog box

- **Number Format**: Specifies how the value is displayed on the cell
- *General*: No specific number format
- *Number*: Specifies the number of decimal places, thousand separator and negative number format
- *Currency*: Number of decimal places, negative number and currency symbol
- *Accounting*: Number of decimal places and currency symbol
- *Date*: Date format with location
- *Time*: Time format with location

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MS Excel

Format Cell dialog box

- *Percentage*: Displays percentage sign after number and can be specified number of decimal Places
- *Fraction*: Displays number in fractions
- *Scientific*: Displays number with scientific notation
- *Text*: Any value in the cell is treated as text
- *Special*: Specifies the format for zip code, phone number and security number
- *Custom*: Displays all the number formats, new formats can be defined

MS Excel

Format Cell dialog box

- **Text Control options:**
  - ◦ **Wrap Text**: to flow text in multiple line in single cell
  - ◦ **Shrink to Fit**: to fit text/data in single cell
  - ◦ **Merge Cells**: To combine multiple cells [merge and center in ribbon]
- **Text Alignment**
  - ◦ **Horizontal**: General, left (indent), center, right (indent), fill, justify, center across selection, distributed (indent)
  - ◦ **Vertical**: Top, center, bottom, justify, distributed
- **Text direction**: context, left to right, right to left
- **Orientation**: -90° to 90°
  - ◦ **Orientation in ribbon has 5 options**: Angle clockwise, angle counterclockwise, rotate text up, rotate text down, vertical text

MS Excel

- **Indent**: 0 to 250
- **Font Effects**: Strikethrough, Superscript, Subscript
- **Protection**: Lock, hidden
- **Paste Special:** To paste copied data with special attribute
  - **Options**: All, Formulas, Values, Formats, Comments, Validation, All except borders
  - **Operations**: Add, Subtract, Multiply, Divide
  - **Transpose**: converts data of column in to row and vice versa
- **Insert cell/row/column:** Ctrl + +
- **Delete cell/row/column:** Ctrl + -
- **Insert worksheet**: Shift + F11 **Insert macrosheet**: Ctrl + F11
- **Options while inserting cell:** Shift cell up/down, entire row/column
- **Hide row**: Ctrl + 9, **Unhide row**: Ctrl + Shift + 9

MS Excel

- **Hide column**: Ctrl + 0, **Unhide column**: Ctrl + Shift + 0
- **Select row**: Shift + Spacebar
- **Select column**: Ctrl + Spacebar
- **Select all**: Ctrl + Shift + Spacebar
- **Autosum:** Performs automatic calculation of arithmetic operations- Sum, Average, Count Numbers, Max, Min
- **Fill options:** Up , Down, Left, Right , Series, Justify
  - Fill Down: Ctrl + D, Fill Right: Ctrl + R
- **Fill Series options:** Series in >> Rows/ Columns, Series type>> Linear, Growth, Date (Day, Week, Month, Year), Autofill
         [Step value and Stop value can be specified]

MS Excel

- **Autoformat:** Changes format of table to preset design (format as table in 2007)
- Clear options: Clear All, Clear Formats, Clear Contents, Clear Comments, **Clear Hyperlink (2013)**

- **Conditional Formatting**
  ◦ To change the formatting of data based on criteria specified
  ◦ **Condition can be checked against**: Cell Value and Formula
  ◦ **Format can be applied to**: Cell value, Specific text, dates, blank, no blank, error, no error
  ◦ **No. of conditions to be checked (2003)**: 3

MS Excel:Chart

- **Chart:** Diagrammatic representation of numeric data
  ◦ **Column chart**: used to compare values across categories
  ◦ **Line chart**: used to display trend over time
  ◦ **Pie chart**: Used to display the contribution of each value to a total
  ◦ **Bar chart**: Best chart for comparing values
  ◦ **Area chart**: emphasize differences between several sets of data over a period of time
  ◦ **Scatter chart**: compares pairs of values
  ◦ **Radar chart**: used when the categories are not directly comparable

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MS Excel: Chart

- **Steps in Column Chart**
  - ◦ **Step 1:** Chart type
  - ◦ **Step 2:** Chart source data
  - ◦ **Step 3**: Chart options: Chart title and chart axes
  - ◦ **Step 4**: Chart Location: as a new sheet or as an object
- **Shortcut for chart (2 dimension column chart):** F11 or Alt + F1
  (Alt + F1 plots chart in current sheet in excel 2007)

MS Excel: Chart

- **Different Parts of Chart**
  - ◦ **Chart area:** entire area covered by chart
  - ◦ **Plot area**: area inside chart are where actual chart is plotted
  - ◦ **Chart Title**: Title that represents the topic of chart
  - ◦ **Category Axis**: x-axis, display different categories to compare
  - ◦ **Value Axis**: y-axis, represents value
  - ◦ **Gridlines**: Vertical or horizontal lines in plot area
  - ◦ **Data series**: A row or column of numbers that are plotted in a chart
  - ◦ **Legend**: A small visual representation of the chart's data series
  - ◦ **Trend line**: Lines drawn on charts to connect a series to show data's best fit. **Types**: linear, polynomial, exponential, power, logarithm, moving average

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MS Excel

- **Sorting:** Arranging data in ascending or descending order based on particular column
- **Sorting Level:** 3 in excel 2003
  - ◦ Sort can be based on: Values, Cell Color, Font Color, Cell Icon
- **Filter:** Displays data with specified critiera in the list
  - ◦ **Autofilter:** displays data by selecting specified value of column (Ctrl+ Shift+L) [Autofilter can be based on text, number and cell color]
  - ◦ **Advanced Filter:** Specifies complex criteria to limit when records are included in the result
- **Subtotal**: used to display summary of data with a summary function, such as sum or average

MS Excel

- **Pivot Table:** A table of statistics that summarizes the data of a more extensive table
- **Text to column**: splits text of single column into multiple columns
  - ◦ **Delimited**: text separated with comma or tab
    - • Types of delimiter: comma, tab, semicolon, space and other symbol
  - ◦ **Fixed width**: text separated with space
- **Flash Fill**: Fills data automatically based on patten (excel 2013)
- **Removes duplicate**: removes duplicate value in a column
- **Data validation**: rule to limit data to be entered in specific cell
  - ◦ **Options**: Data Validation, Circle invalid data, Clear validation circle

MS Excel:

- ◦ **Validation Criteria:** Any value, Whole number, decimal, list, date, time, text length, custom
- ◦ **Input Message:** Validation message that is displayed in active cell before entering data
- ◦ **Error Alert**: Validation message displayed after wrong data entry
  - • Style: stop, warning, informational
- **Consolidate:** Summarizes data from different cell range displaying result in single output range
- **3D Reference**: refers to the same cell or range of cells on multiple worksheets, used to calculate in multiple sheet with single formula
- **Group**: to group number of rows/columns so that desired group can be shown or hidden (ungroup to remove grouping)
- **Ungroup**: to remove grouping of row/column

MS Excel:

- **What if analysis**
  - ◦ **Scenario Manager**: Allows to create and save different groups of values or scenarios and switch between them.
  - ◦ **Goal Seek**: Used to find the right input for required result
  - ◦ **Data Table**: used to see the results of many different possible inputs at the same time.
- Sheet tab options in Page Setup dialog box
  - ◦ **Print area**: displays the cell range which is set to print area
  - ◦ **Rows to repeat at top**: rows specified to print in each page
  - ◦ **Columns to repeat at left**: columns specified to print in each page
  - ◦ **Print options**: Gridlines, Black and White, Draft Quality, Row and Column heading
  - ◦ **Page Order**: Down, then Over/ Over, then down

MS Excel

- **Print Area:** to set certain area (cell range) to be printed
  - Options: Set print area, Clear print area, add to print area
- **Break**: to divide page horizontally or vertically
  - Options: Insert page break, Remove page break, Reset all page break
- **Background**: to set background picture of worksheet which is not printed by default
- **Scale**: to enlarge or reduce page (10% to 400%)
- **Zoom**: 10% to 400%
- **Define Name**: To define name that is alternate of cell reference
- **Name Manager**: To define, edit and delete name (Ctrl + F3)

MS Excel

- **Sheet options:** Gridlines- View/ Print, Heading- View/ Print
- **Formula Auditing**
  - Formula auditing in Excel allows you to graphically display the relationship between formulas and cells
  - **Trace Precedent**: Draws arrows from that cell to each cell referenced in the formula
  - **Trace Dependent**: Draw arrows from every cell containing a formula that references your current location
  - **Remove Arrows**: Remove precedent and dependent arrows
  - **Show Formula**: Displays formula instead of resulting value (Ctrl + ~)
  - **Error Checking**: Checks the formula if it contains error
  - **Evaluate Formula**: Evaluates formula step by step to result

MS Excel

- **Calculation group**
  - ◦ **Calculation option**: automatic, manual and automatic except data table
  - ◦ **Calculate now**: calculate entire workbook (F9)
  - ◦ **Calculate sheet**: calculate current worksheet (Shift + F9)
- **Function Library**
  - ◦ **Insert function**: enables function palette
  - ◦ **Functions included in excel**: Financial, Logical, Text, Date and Time, Lookup & Reference, Math and Trig (Mathematical and Trigonometric, Statistical, Engineering etc.
- **Different views in excel**
  - ◦ Normal, Page Layout, Page Break Preview, Custom view, Full screen
  [custom view allows to save current view and it can be viewed any time]
  Default view: Normal

MS Excel

- **Show/hide options:** Ruler, gridlines, formula bar, heading
- **Zoom to selection**: to zoom the selected range of cell to fit entire screen
- **Split**: divides the window into 4 different panes from the cursor position
- **Hide**: hides current document windows
- **Freeze Panes:** to lock specified row/column not to move while scrolling
  - • **Options:** Freeze Panes, Freeze top rows, freeze left columns
- **Macro:** Macro in excel can use shortcut only with Ctrl key
- **Save Workspace**: used to save all opening workbooks
  - • File extension of workspace is .xlw

MS Excel

- **OPERATORS AND OPERANDS**
  - An operator is an expression that performs an operation. Operands are value that involve in operation.
- **Types of operator**
- **Arithmetic/ Mathematical Operator**: Performs mathematical calculations and returns the result
  - + (plus) → Addition
  - - (minus) → Subtraction/Negation
  - * (asterisk) → Multiplication
  - / (forward slash) → Division
  - MOD → Modulus (Remainder) / % (percentage)
  - ^ (caret) → Exponentiation (Power)

MS Excel

- **Comparison/Relational Operator**: It compares two values and return either TRUE or FALSE
  - = → Equal to
  - > → Greater than
  - < → Less than
  - > = → Greater than or equal to
  - < = → Less than or equal to
  - <> → Not equal to
- **Text/String/Concatenation Operator**: Used to combine two string (alphanumeric) values and return result. The process to combine the values is known as concatenation. & (ampersand) is used as string operator

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MS Excel

- **Reference Operator**: Combine range of cells for calculations
  - : (colon) → Range Operator
  - **,** (comma) → Union Operator
  - Space → Intersection Operator
- **Logical Operator**: Combine two or more relational operators and return result
  - **AND** : Returns true if all of the conditions are true otherwise returns false
  - **OR**: Returns true if any one of the given conditions is true otherwise returns false
  - **NOT**: Returns true if the condition is false and vice versa

MS Excel

Logical function syntax

- =if (logic / condition, true value, false value)
- =if (and (logic 1, logic 2,…), true value, false value)
- =if(or (logic 1, logic 2,…), true value, false value)

Function	Logic 1	Logic 2	Result
If(and(	True	True	True
	True	False	False
	False	True	False
	False	False	False
If(or(	True	True	True
	True	False	True
	False	True	True
	False	False	False

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MS Excel

- **REFERENCING METHOD**
- **Relative references**: It is default referencing method. If the position of the cell that contains the formula changes, the reference is changed
  - E.g. =A1+B1
- **Absolute Reference**: If the position of the cell that contains the formula is changed, absolute reference remains same. Dollar Sign ($) is used to fix row and column
  - E.g: = A1+B1
- **Mixed reference**: It combination of relative and absolute reference. It has either an absolute column and relative row, or absolute row and relative column.
  - E.g.: =$A1+B$2

MS Excel: Common Errors

- **ERROR CODES:**
  - **######**→ Number did not fit in the cell
  - **#DIV/0!** → Cell divide by empty cell or zero
  - **#NAME?** → Missed Spelled function, not reffering text to formula, not existed reference
  - **#N/A** → Referenced or Value not found
  - **#NULL!** → Incorrect range separator
  - **#NUM!** → Incorrect argument/ Impossible Calculation
  - **#REF!** → Invalid cell reference
  - **#VALUE**→ When formula contains parameter of wrong data type

MS Excel: Common Errors

	A	B	C	D
1	**Value 1**	**Value 2**	**Error**	**Example**
2	5		#DIV/0!	=A1/0
3	20	10	#NAME?	=su(A2,B2) =SUM(A2,ten) = IF(A2>125, voter, non voter)
4	mouse	500	#N/A	=VLOOKUP("pen",A3:B3,2,0)
5	5	10	#NULL!	=A4 B4 =SUM(A4 B4)
6	-25		#NUM!	=SQRT(A5)
7	1/2/2020	2/10/1999	#NUM!	=DATEDIF(A6,B6,"M") =1000^5000
8	5	ten	#VALUE!	=A9+B9

MS Excel

- **DATE/TIME FUNCTION**
  - **DATE**: Returns date, syntax: DATE (year, month, day)
  - **TIME**: Returns time, syntax: TIME (hour, minute, second)
  - **HOUR**: Returns hour of time value, syntax: HOUR (serial_number)
  - **MINUTE**: Returns minutes of time value, syntax: MINUTE (serial_number)
  - **SECOND**: Returns second of time value, syntax: SECOND (serial_number)
  - **NOW**: Returns current date and time, NOW()
  - **TODAY**: Returns current date, TODAY()
  - **DAY**: Returns the day of date , DAY(serial_number)
  - **DATEDIF**: Returns difference between two dates.

MS Excel

- ◦ **MONTH**: Returns the month of date, MONTH(serial_number)
- ◦ **YEAR**: Returns the month of date, YEAR(serial_number)
- ◦ **WEEKDAY**: Returns the day of the week
- ◦ **WORKDAY**: Returns a date that is a supplied number of working days (excluding weekends and holidays) ahead of a given start date. Syntax: WORKDAY(start_date, days, [holidays])
- ◦ **NETWORKDAYS**: Returns the number of whole working days between start_date and end_date. Syntax: NETWORKDAYS(start_date, end_date, [holidays])

MS Excel

- • **INBUILT FUNCTIONS**

String Function
- • **Concatenate** - join multiple strings into one string. (up to 30 strings).
- • **Substitute** – Replaces existing text with new text in a text string
- • **Replace** - Replace a part of text string with different text string
- • **Search** - Returns number character at which specified character is first found
- • **Value** - Converts a text string that represents a number to numeric value
- • **Len** - Returns number of characters in a text string
- • **Lower** - Converts text to lowercase
- • **Proper** - Converts text to title case (first letter of each word capital)

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MS Excel

- **Trim-** Removes extra spaces
- **Left-** Extracts specified no. of characters from left
- **Right-** Extracts specified no. of characters from right
- **Mid-** Extract specified no. of characters from middle
- **Rept-** Repeats text to specified no. of times

Numeric Functions

- **Abs :** Returns the absolute value of a number
- **Average:** Returns average value. There can be up to 30 values entered
- **Cos:** Returns the cosine of an angle.
- **Even :** Rounds a number up to the nearest even integer.

MS Excel

- **Count :** Counts number of cell containing number
- **Counta:** Counts number non empty cells
- **CountBlank:** counts blank cells.
- **Fact :** Returns the factorial of a number
- **Max :** Returns Maximum value. There can be up to 30 values entered.
- **Min :** Returns minimum value. There can be up to 30 values entered.
- **Mod :** It returns the remainder
- **Odd :** It rounds a number up to the nearest odd integer.
- **Product :** Returns product
- **Round :** The syntax for the Round function

MS Excel

- **RoundDown:** Always rounds towards 0.
- **RoundUp :** Rounds away from 0.
- **Int:** Rrounds down to nearest integer removing decimal part
- **Sign :** Returns sign of number, 1 for positive, -1 for negative and 0 for 0 (zero).
- **Sin :** Returns the sine of an angle.
- **Sqrt:** Returns the square root of a number
- **Sum:** Adds all numbers in a range of cells and returns the result
- **SumIf :** Adds all numbers in a range of cells, based on a given criteria..
- **Tan :** Returns the tangent of an angle.

MS Excel

- **POINTS TO BE NOTED**
  - **Default sheet:** 3 (2003, 2007), 1 (2013)
  - **Maximum sheet to be set in default:** 255
  - **Iteration**
    - **Default**: 100, **max**: 32767, **minimum**: 1
  - **R1C1 cell reference**
    - Represents cell reference with number of row and column instead of column heading and row number
  - **Types of Sheet**: Worksheet, Macrosheet, Chart Sheet
  - **Direction of enter key**: Down, Up, Left, Right

MS Excel

- **POINTS TO BE NOTED**
  - **Custom List:** List that can be created to fill a range of cells with own personal list
  - **Maximum characters in a cell**: 32767
  - **No. of nested function:** 64
  - **Maximum no. of decimal places:** 30
  - **Array Formula:** Multiple calculations in single formula
  - **Complex Formula:** Formula with more than one mathematical operator

MS Excel

- **Excel Shortcuts**
  - **Ctrl + 1:** Format Cell dialog box
  - **Ctrl + 2:** Bold
  - **Ctrl + 3:** Italic
  - **Ctrl + 4:** Underline
  - **Ctrl + 5:** Strikethrough
  - **Ctrl + F6**: Switch between opened workbooks/windows
  - **Ctrl + Pagedown:** Next sheet
  - **Ctrl + Pageup:** Previous sheet
  - **Alt + = :** Autosum

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MS Excel

- **Excel Shortcuts**
  - **Ctrl + Shift + 1**: Number format with comma
  - **Ctrl + Shift + 2**: Time format
  - **Ctrl + Shift + 3:** Date format
  - **Ctrl + Shift + 4:** Currency format
  - **Ctrl + Shift + 5:** Percentage format
  - **Ctrl + Shift + 6:** Scientific format
  - **Ctrl + Shift + 7**: Outline Border
  - **Ctrl + Space:** Select column
  - **Shift + Space:** Select row

MS Excel

- **Excel Shortcuts**
  - **Ctrl + + :** Insert row/column/cell
  - **Shift + F11/ Alt + Shift + F1:** Insert Worksheet
  - **Ctrl + F11:** Insert Marcosheet
  - **Ctrl + - :** Delete row/column/cell
  - **Ctrl + ~:** Show formula
  - **F2:** Edit cell
  - **Ctrl + ; :** Current date
  - **Ctrl + Shift + ; :** Current time
  - **Shift + F3:** Function Pane