basic and some advance functions

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Microsoft Excel:
Basic and some Advance Functions

By:
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Microsoft Excel is a spreadsheet developed by Microsoft for Windows, macOS, Android and iOS. It organizes numeric or text data in spreadsheets or workbooks.

Spreadsheet is an electronic document in which data is arranged in the rows and columns of a grid and can be manipulated and used in calculations.
Introduction

Advantages of Worksheet

- Data entry - quick and accurate
- Recalculation
- Charts
- Share information
- Produce a new worksheet
- Orderly manage important information
The elements in Microsoft Excel

Microsoft Excel consists of several elements as shown in the following table.

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell</td>
<td>Box collision between space and line.</td>
</tr>
<tr>
<td>Row</td>
<td>Horizontal box marked with the numbers 1, 2, 3 etc.</td>
</tr>
<tr>
<td>Column</td>
<td>Vertical box marked with the letters A, B, C, etc.</td>
</tr>
<tr>
<td>Title Bar</td>
<td>There on the screen that broadcasts the title / name of the worksheet</td>
</tr>
<tr>
<td>Tab</td>
<td>Menu that have toolbar</td>
</tr>
<tr>
<td>Name box</td>
<td>Broadcast position the mouse pointer on a cell</td>
</tr>
<tr>
<td>Toolbar</td>
<td>Contains icon serves as a &quot;shortcut&quot; for commonly used commands such as Save, Print, Paste etc..</td>
</tr>
<tr>
<td>Formula Bar</td>
<td>Publish the contents of the cell (as you type)</td>
</tr>
<tr>
<td>Navigation Tab</td>
<td>Publish the next sheet, previous, first and last</td>
</tr>
<tr>
<td>Tab Sheet</td>
<td>Publish worksheets are being used - we might have more than one worksheet</td>
</tr>
</tbody>
</table>

Example:

B3
(Column B, Line 3)

Cell name shown in Name Box.
The elements in Microsoft Excel

- **Title bar**
- **Name box**
- **Cell**
- **Formula Bar**
- **Row**
- **Column**
- **Tab Sheet**
- **Tab**
- **Toolbar**
Create Worksheets

The steps:

1. Click [File]
2. Click [New]
3. New Worksheet
Basic Formatting

Font Setting

Font Type
- Bold
- Italic
- Underline

Font Size
- Increase Font Size
- Decrease Font Size

Font Color
- Fill Color
- Font Color

Cell Borders

Example

<table>
<thead>
<tr>
<th>Record No.</th>
<th>Date</th>
<th>Persons</th>
<th>Accomodation (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21-Jan</td>
<td>2</td>
<td>200.00</td>
</tr>
<tr>
<td>2</td>
<td>24-Jan</td>
<td>5</td>
<td>150.00</td>
</tr>
<tr>
<td>3</td>
<td>25-Jan</td>
<td>1</td>
<td>150.00</td>
</tr>
<tr>
<td>4</td>
<td>27-Jan</td>
<td>3</td>
<td>200.00</td>
</tr>
<tr>
<td>5</td>
<td>30-Jan</td>
<td>8</td>
<td>250.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>19</td>
<td>950.00</td>
</tr>
</tbody>
</table>
Basic Formatting

Alignment

Example: Text Alignment

<table>
<thead>
<tr>
<th>Top</th>
<th>Middle</th>
<th>Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>Center</td>
<td>Right</td>
</tr>
</tbody>
</table>

Example: Wrap Text

Example: Merge & Center

Bottom Align
Middle Align
Orientation
Wrap Text

Top Align
Left
Center
Right
Decrease Indent
Increase Indent
Data types:

Each column has an associated data type that specifies the type of data the column can hold.

Data type also determines what kinds of operations you can do on the column.

Common data types are:

- Text
- Number
- Date
- Time

Number Format

Accounting Number Format

Percent Style

Comma Style

Decrease Decimal

Increase Decimal
Excel

Data Format

Example:

<table>
<thead>
<tr>
<th>Record No</th>
<th>Date</th>
<th>Persons</th>
<th>Accommodation (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21-Jan</td>
<td>2</td>
<td>MYR 200.00</td>
</tr>
<tr>
<td>2</td>
<td>24-Jan</td>
<td>5</td>
<td>MYR 150.00</td>
</tr>
<tr>
<td>3</td>
<td>25-Jan</td>
<td>1</td>
<td>MYR 350.00</td>
</tr>
<tr>
<td>4</td>
<td>27-Jan</td>
<td>3</td>
<td>MYR 200.00</td>
</tr>
<tr>
<td>5</td>
<td>30-Jan</td>
<td>8</td>
<td>MYR 250.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>19</td>
<td>MYR 1,150.00</td>
</tr>
</tbody>
</table>

Text

Number

Date format

Accounting Number Format with 2 decimal

Comma Style
A **formula** is an expression (mathematical operation) which calculates the value of a cell.

**Functions** are predefined formulas and are already available in Excel to perform a series of mathematical operations.

Begin with ‘=’ symbol.

Two ways to write a formula & function, (1) in the cell or (2) in the Formula Bar.

<table>
<thead>
<tr>
<th>The formula icon</th>
<th>Operation</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>^</td>
<td>Power</td>
<td>=A1^3</td>
</tr>
<tr>
<td>+</td>
<td>Add</td>
<td>=A1+A2</td>
</tr>
<tr>
<td>-</td>
<td>Minus</td>
<td>=A1-A2</td>
</tr>
<tr>
<td>*</td>
<td>Multiply</td>
<td>=A1*3</td>
</tr>
<tr>
<td>/</td>
<td>Divide</td>
<td>=A1/50</td>
</tr>
<tr>
<td>Mix</td>
<td></td>
<td>=(A1+A2+A3)/3</td>
</tr>
</tbody>
</table>

**Priority Ordering**

1) Power or equivalent in brackets: ^ and ( )
2) Multiply and divide : * and /
3) Add and minus : + and -

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVERAGE</td>
<td>Calculate the average number of group</td>
</tr>
<tr>
<td>=AVERAGE(A1:A5)</td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>Provide maximum value in the interval sought</td>
</tr>
<tr>
<td>MAX(A1:A5)</td>
<td>Cells</td>
</tr>
<tr>
<td>MIN</td>
<td>Return the minimum value in the interval given</td>
</tr>
<tr>
<td>MIN(A1:A5)</td>
<td>cell</td>
</tr>
<tr>
<td>SUM</td>
<td>Calculate the total value of the given cell</td>
</tr>
<tr>
<td>SUM(A1:A5)</td>
<td>interval</td>
</tr>
</tbody>
</table>
Using Formula

**Example**

Calculate the total cost for the accommodation.

Formula:

\[=E5+E6+E7+E8+E9\]

**Steps:**

1) Click on cell E10
2) Press “=”
3) Select cell E5 followed by symbol “+”
4) Continue with cell E6, E7, E8 and E9.
5) Press ENTER.
Using Function

Example

Calculate the total cost for the accommodation.

Function:

=SUM(E5:E9)

Steps:

1) Click on cell E10
2) Click \( \text{fx} \) on the formula bar
3) A dialog box (A) appear. Select category “Math & Trig”.
4) Find SUM, then click [OK].
5) Dialog box (B) appear.
6) Select E5 until E9.
7) Press [OK]
2 types of cell referencing

- **Relative**
  - Default setting in excel
  - Change when a formula is copied to another cell.
  - To repeat the same calculation across multiple rows or columns.

- **Absolute**
  - Remain constant no matter where they are copied.
  - Designated in a formula by a dollar sign ($).
  - Can precede the column reference, the row reference, or both.

### Variations and Description

<table>
<thead>
<tr>
<th>Variations</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A$1</td>
<td>The row does not change</td>
</tr>
<tr>
<td>$A1</td>
<td>The column does not change</td>
</tr>
<tr>
<td>$A$1</td>
<td>The column and row do not change</td>
</tr>
</tbody>
</table>

**Shortcut:**
Press the F4 key on your keyboard to switch between relative and absolute cell references.
Charts is also called graph.

Allows user to visualize numerical data into visual representation.
Types

Common types of charts are:
✓ Bar chart
✓ Column chart
✓ Pie chart
✓ Line chart

Other types of charts supported by Microsoft Office and Excel:
✓ Doughnut charts
✓ Area chart
✓ XY (scatter)
✓ Bubble chart
✓ Stock chart
✓ Surface chart
✓ Radar charts
✓ Treemap chart (version 2016 and above)
✓ Sunburst chart (version 2016 and above)
✓ Histogram charts (version 2016 and above)
✓ Box and Whisker charts (version 2016 and above)
✓ Waterfall charts (version 2016 and above)
✓ Funnel charts (version 2016 and above)
✓ Combo charts (version 2013 and above)
✓ Map chart (Excel only)
Inserting Charts

The following are the steps to insert chart into a worksheet.

1. Switch to [Insert] Menubar

2. Select the data

3. Click [Recommended Charts] or click desired chart type

4. Choose chart type
   Example: Pie chart

5. Click [OK]

6. Chart created
Editing Charts

To edit a chart, select the chart, then a new Menubar [Chart Design] will appear.

- **Add and edit the chart elements** such as title, labels, and legend.
- **Swap the data over the axis and update the data selection.**
- **Move chart to other location.** Example: from one worksheet or new sheet.
- **Change the chart's color combination.**
- **Change the chart's layout.**
- **Change the chart's style.**
- **Example:** change pie chart to bar chart.
- **Move chart to other location.** Example: from to other worksheet or new sheet.

Change the chart's layout
Change the chart's color combination
Change the chart's style
Perform Sorting

To perform sorting, select the data then click on [Sort & Filter] under menu bar [Home]. Three options available:

1) Ascending – Smallest to Largest
2) Descending – Largest to Smallest
3) Custom Sort

(1) Select ALL data

(2) Click on [Sort & Filter] and choose one of the options

(3) Dialog box, If custom sort is selected

(a) Check the box My data has headers

(b) Select the header name to sort by

(c) Choose order ...

(d) Click [OK]
Perform Filtering

To perform filtering, select the data then click on [Sort & Filter] under menu bar [Home].

1. Select ALL data
2. Click on [Sort & Filter] and choose [Filter]
   - This icon will appear next to the header of each column
3. Click on the icon to open a dialog box.
   - Example: Filtered gender. Female only
4. Select data to filter.
   - Example: Female
5. Click [OK]
Conditional formatting

Conditional formatting can be used to visualized and analyze data, detect critical issues, and identify patterns and trends.

(1) Select data
(2) Click [Conditional Formatting]
(3) Click on the option
Using conditional formatting

Example

Highlight cell where CGPA is less than 3.00

(1) Select data

(2) Choose [Less Than…]

(3) A dialog appear. Enter 3, then press [OK]

Results:
Cell with values less than 3 will be highlighted
Flash Fill

Flash fill analyzes the information entered and automatically fills data when it senses a pattern.

It can be used to:
1) separate data (from a single column)
2) combine data (from two different columns)

Example 1:
Separate name into two parts first name and father’s name.

Example 2:
Combine name (first name and father’s name) into one column.
Turn on Flash Fill

If Flash Fill does not work automatically:

1) Check the setting in Excel
2) Run it manually

Run Flash Fill manually

Go to Data > Flash Fill, or press Ctrl+E.

Check the setting

To turn Flash Fill on, go to Tools > Options > Advanced > Editing Options > check the Automatically Flash Fill box.
Pivot Table

Pivot Table can be found under menu bar [Insert].

1. Select the data

(2) Click on [Pivot Table]

(3) A dialog box will appear. Click [OK]

New sheet will appear

A pivot table is a table of statistics that summarizes the data.
Customizing Pivot Table Report

The content of the report generated by the Pivot Table can be customized as following example.

Example:

Create a report of the number of students that stay at INASIS based on their gender.

1. Click on INASIS and drag to the Rows section.
2. Click on Gender and drag to the Column section.
3. Click on Gender and drag to the Values section.

Report preview
Waterfall Chart

A waterfall chart is a form of data visualization that helps in understanding the cumulative effect of sequentially introduced positive or negative values.

Example:

Create a Waterfall chart to show how net income is affected by a series of positive and negative values such as:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>25,250.00</td>
</tr>
<tr>
<td>Purchases</td>
<td>(7,500.00)</td>
</tr>
<tr>
<td>Gross margin</td>
<td>17,750.00</td>
</tr>
<tr>
<td>Administration</td>
<td>(2,500.00)</td>
</tr>
<tr>
<td>Net income</td>
<td>15,250.00</td>
</tr>
</tbody>
</table>

1. Select the data
2. Click the [Recommended Charts]
3. Click [All Charts]
4. Click [Waterfall]
5. Click [OK]
Waterfall Chart - Example

The columns are color coded so you can quickly tell positive from negative numbers.

The chart shows how the initial value **Revenue** change over a sequence of events and how the final value **Net income** is affected.

Waterfall charts are also called bridge charts.
**HLOOKUP**

Looks for a value in the **top row** of a table and returns the value in the same column.

For example, the function below looks up the value 45678 (cell G3) in the range D3:M7.

\[ \text{Value to find} \quad \text{Row index num} \]

\[ \text{Range} \]

\[ =\text{HLOOKUP}(D10, \text{D3:M7}, 5) \]

- **Find**
- **CGPA**
- **45678**
- **3.70**

**Returned value.**

**CGPA 3.70 row 5**
VLOOKUP

Looks for a value in the leftmost column of a table, and then returns a value in the same row.

Example: Lookup by specific value

For example, the function below looks up the value 45678 (cell J3) in the range C3:G12.

\[ \text{=VLOOKUP(J3, C3:G12, 5)} \]

Value to find \hspace{5em} Column index num

Range

Returned value. CGPA 3.70

Column 5
**VLOOKUP**

*Example: Lookup by value in range*

Looks up the group for given ID number.

ID number and range are as followings:

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 5</td>
<td>G1</td>
</tr>
<tr>
<td>6 – 10</td>
<td>G2</td>
</tr>
<tr>
<td>11 – 15</td>
<td>G3</td>
</tr>
<tr>
<td>16 – 20</td>
<td>G4</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>G5</td>
</tr>
</tbody>
</table>

By default, the table must be sorted in an ascending order.

```
=VLOOKUP(H3, D3:E7, 2)
```

Value to find

Column index num

Range

Returned value: G2
Index and Match

The MATCH function returns the position of a value in a given range. For example, the function below looks up the value 45678 (cell J3) in the range C3:C12 (column C).

=MATCH(J3, C3:C12)

Returned value.

The position of matric 45678 in the list that is 4th position.
Index and Match

Index

The INDEX function returns a specific value based on the reference given. For example, what is the CGPA value at the 4th position?

\[ \text{INDEX(G3:G12,4)} \]

Range

Position

Returned value. CGPA 3.70 at position 4
Combining (Index and Match)

INDEX and MATCH is a powerful combination. MATCH find the position and INDEX use the position to lookup the value.

For example, what is the CGPA for a student with martric num 45678? Index will find its position in column Matric and use the position number to lookup the CGPA from the CGPA column.

\[ =\text{INDEX(G3:G12, MATCH(J3, C3:C12))} \]

The position of matric 45678 in the list that is 4\textsuperscript{th} position and the CGPA is 3.70.
Forecast Tool

Forecast tool can be used to predict a future value like future sales, revenue, number of customers and etc.

The forecasting is based on the historical timeline and historical values.

**Example:**

Forecast the number of customer for **Jan 2020** based on 2019 data.

<table>
<thead>
<tr>
<th>DATE</th>
<th>NUMBER OF CUSTOMER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-19</td>
<td>9</td>
</tr>
<tr>
<td>Feb-19</td>
<td>10</td>
</tr>
<tr>
<td>Mar-19</td>
<td>13</td>
</tr>
<tr>
<td>Apr-19</td>
<td>14</td>
</tr>
<tr>
<td>May-19</td>
<td>15</td>
</tr>
<tr>
<td>Jun-19</td>
<td>16</td>
</tr>
<tr>
<td>Jul-19</td>
<td>15</td>
</tr>
<tr>
<td>Aug-19</td>
<td>14</td>
</tr>
<tr>
<td>Sep-19</td>
<td>16</td>
</tr>
<tr>
<td>Oct-19</td>
<td>18</td>
</tr>
<tr>
<td>Nov-19</td>
<td>18</td>
</tr>
<tr>
<td>Dec-19</td>
<td>20</td>
</tr>
</tbody>
</table>

The timeline requires consistent intervals between its data points. For example, monthly intervals (1st of every month), yearly intervals, or numerical intervals.
Forecast Tool—Simple Forecasting

Example:

Solution. Use function FORECAST.ETS.

\[ =\text{FORECAST.ETS}(\text{D5}, \text{B2:B13}, \text{A2:A13}, 1, 1) \]
Forecast Tool – Using Forecast Sheet Tool

Example:

Forecast the number of customer for **Jan-Jun 2020** based on 2019 data.

1. Click **[Data]**
2. Select the data
3. Click **[Forecast Sheet]**
4. Set end date
5. To show click on **[Options]**
6. Click **[Create]**

Example:
Forecast the number of customer for **Jan-Jun 2020** based on 2019 data.
Forecast Tool – Options Description

<table>
<thead>
<tr>
<th>Forecast Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecast Start</td>
<td>Pick the date for the forecast to begin.</td>
</tr>
<tr>
<td>Confidence Interval</td>
<td>Check or uncheck Confidence Interval to show or hide it. The confidence interval is the range surrounding each predicted value.</td>
</tr>
<tr>
<td>Seasonality</td>
<td>Seasonality is a number for the length (number of points) of the seasonal pattern and is automatically detected.</td>
</tr>
<tr>
<td>Timeline Range</td>
<td>The range used for timeline. This range needs to match the Values Range.</td>
</tr>
<tr>
<td>Values Range</td>
<td>The range used for value series. This range needs to be identical to the Timeline Range.</td>
</tr>
<tr>
<td>Fill Missing Points Using</td>
<td>To handle missing points,</td>
</tr>
<tr>
<td>Aggregate Duplicates Using</td>
<td>If data contains multiple values with the same timestamp, Excel will average the values.</td>
</tr>
<tr>
<td>Include Forecast Statistics</td>
<td>Additional statistical information on the forecast included in a new worksheet such as the smoothing coefficients (Alpha, Beta, Gamma), and error metrics (MASE, SMAPE, MAE, RMSE).</td>
</tr>
</tbody>
</table>
**Forecast Tool – Using Forecast Sheet Tool**

**Result:**

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Values</th>
<th>Forecast</th>
<th>Lower Confidence Bound</th>
<th>Upper Confidence Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-19</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb-19</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mar-19</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr-19</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May-19</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jun-19</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jul-19</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aug-19</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sep-19</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct-19</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov-19</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec-19</td>
<td>20</td>
<td>20</td>
<td>20.00</td>
<td>20.00</td>
</tr>
<tr>
<td>Jan-20</td>
<td>20.295538</td>
<td>17.80</td>
<td>22.79</td>
<td></td>
</tr>
<tr>
<td>Feb-20</td>
<td>21.115617</td>
<td>18.33</td>
<td>23.91</td>
<td></td>
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<tr>
<td>Mar-20</td>
<td>21.937695</td>
<td>18.88</td>
<td>25.00</td>
<td></td>
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<tr>
<td>Apr-20</td>
<td>22.758774</td>
<td>19.45</td>
<td>26.05</td>
<td></td>
</tr>
<tr>
<td>May-20</td>
<td>23.579853</td>
<td>20.04</td>
<td>27.12</td>
<td></td>
</tr>
<tr>
<td>Jun-20</td>
<td>24.400932</td>
<td>20.65</td>
<td>28.15</td>
<td></td>
</tr>
</tbody>
</table>

- **Forecast values (Jan–Jun)**
- **Smoothing coefficients**
- **Error metrics**
- **Chart**

The Excel chart shows the historical values and forecast values (Jan–Jun) with confidence bounds.
What-if-Analysis

What-If Analysis is the process of changing the values in cells to see how those changes will affect the outcome of formulas on the worksheet.

Three types:
1. Scenarios,
2. Goal Seek,
3. Data Tables.

What-if-Analysis can be found under [Data] Menu bar

Three types
Forecasting

What-if-Analysis (Scenario Manager)

Works on different scenarios provided to it, it uses a group of ranges which impact on a certain output and can be used for making different scenarios.

Example:

Looking at the combination of revenues (product A, B and C) that affect on the total revenue and total contribution.

(1) Click [Scenario Manager]

(2) Select the input cell

Note: These values affect the total revenue and the total contribution.

(3) Scenario Manager dialog appear. Click [Add]
What-if-Analysis (Scenario Manager)

(3) Prepare original values

(4) Enter name
(5) Maintain
(6) Enter comment (if any)

(7) Click [OK]

(8) Do not change the values. Then click [OK]

(9) Once return to the scenario manager dialog, click [Add] to add more scenarios
What-if-Analysis (Scenario Manager)

(10) Repeat the process. Enter the first scenario.

(11) Enter name. Exp: Scenario 1
(12) Maintain
(13) Enter comment (if any)
(14) Click [OK]

(15) Enter desired values. Then click [OK]

(16) Repeat the process. Enter the second scenario.

(17) Enter name. Exp: Scenario 2
(18) Maintain
(19) Enter comment (if any)
(20) Click [OK]

(21) Enter desired values. Then click [OK]
What-if-Analysis (Scenario Manager)

(22) List of scenarios

(23) Click [Summary]

(24) Select result cells. Click the first cell, follow by ctrl key, then click the second cell.

(25) Click [OK]

The results

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.
What-if-Analysis (Goal Seek)

Goal Seek allows you to see how one data item in a formula impacts another. “cause and effect” scenarios.

**Example:**

To achieve MYR 150,000 net income, what is the expected revenue for Product C?

1. Click [Goal Seek]
2. Select the cell to hold expected value/target
3. Set the target value RM 150,000
4. The changing cell
5. Press [OK]
What-if-Analysis (Goal Seek)

Excel will find the best value to achieve the target value.

(6) Press [OK]