5- SQRT(number): Returns a positive square root.

6- MOD(number, divisor): Returns the remainder after number is divided by divisor. The result has the same sign as divisor.

Paste Options

Copying and Pasting data is one of the most performed actions in Excel. There is a lot more to copy-pasting than simple Control + C and Control + V, this example illustrates the various paste options in Excel. Cell B5 below contains the SUM function which calculates the sum of the range B2:B4. Furthermore, we changed the background color of this cell to yellow and added borders.

A- Paste: The Paste option pastes everything.

1. Select cell B5, right click, and then click Copy (or press CTRL + C).
2. Next, select cell F5, right click, and then click Paste under 'Paste Options:' (or CTRL + V).

B- Values: The Values option pastes the result of the formula.

a. Select cell B5, right click, and then click Copy (or press CTRL + C).
b. Next, select cell D5, right click, and then click Values under 'Paste Options:'.

C- Formulas: the formula option only pastes the formula.

a. Select cell B5, right click, and then click Copy (or press CTRL + C).
b. Next, select cell F5, right click, and then click Formulas under 'Paste Options:'.
D- Formatting: The Formatting option only pastes the formatting.
   a. Select cell B5, right click, and then click Copy (or press CTRL + C).
   b. Next, select cell D5, right click, and then click Formatting under 'Paste Options:'

   ![Formatting Option](image)

   **Note:** The Format Painter copy/pastes formatting even quicker.

E- Paste Special: The Paste Special dialog box offers many more paste options. To launch the Paste Special dialog box, execute the following steps.
   a. Select cell B5, right click, and then click Copy (or press CTRL + c).
   b. Next, select cell D5, right click, and then click Paste Special.

   ![Paste Special Dialog](image)

**Paste Special - Operations.**

Operations options give you a quick way to perform the given operations without applying a formula or directly changing the cell contents.

- **Skip Blanks:** This would skip copying and pasting the blanks. A practical use if this could be when you have data split into 2 columns and you want to combine it in a single column.

- **Transpose:** As the name suggests, if this is checked, it transposes the data when you paste it.
When you move or copy cells that contain references to other cells, such as a formula that references another cell, those references are relative. Excel will change the cell references to match the relative positioning in the new location. An example will make this clearer. Suppose as shown in Figure 1 below, you have a function in cell C7 that adds up the amounts in cells C3 through C6. The function looks like this: C7 =SUM(C3:C6).

Now suppose that you click the Copy button on the Ribbon, click cell D7, and click the Paste button on the Ribbon. The formula is copied to D7. However, the copied version appears like this: D7 =SUM(D3:D6). Excel has assumed that the references to the cells in column C in the original formula were context-sensitive. It assumed that what you really wanted was to sum the values in the four cells immediately above D7, rather than to sum the cells in column C. And, in this case, it is right. That’s called a relative reference.

The alternative to a relative reference is an absolute reference, which never changes no matter where you copy it. For example, in Figure 2, cell D4 contains a formula that multiplies the base amount in C5 by the bonus percentage in C2. When that formula is copied into D6:D8, you want the copies to update the references to the base amounts, but you don’t want the reference to the bonus amount to change. Therefore, you make the reference to C2 an absolute reference by placing dollar signs before the column letter and before the row number, like this: $C$2. An absolute reference does not change, no matter where you copy it.

A mixed reference is a reference that is partially absolute and partially relative. For example, $C2 makes the column absolute but keeps the row number relative, and C$2 does the opposite.

TIP: You can press F4 to toggle among the reference types (absolute, mixed, and relative) for a selected reference.
The IF function is one of the most popular functions in Excel, and it allows you to make logical comparisons between a value and what you expect.

So, an IF statement can have two results. The first result is if your comparison is True, the second if your comparison is False.

Syntax

IF(logical_test, [value_if_true], [value_if_false])

For example: check the value of C2 and return 1 if is a “yes” and return 2 otherwise.

Sol: =IF(C2 = "Yes", 1, 2) says IF(C2 = Yes, then return a 1, otherwise return a 2).

Another example: check if the cells A1:A3 contain the text “red” and return *the color is red if true* and *the color is not red otherwise*.

Sol: =IF(A1="red", "the color is red", "the color is not red").

![Excel IF Function Example](image-url)
It is possible to nest multiple IF functions within one Excel formula. You can nest up to 7 IF functions to create a complex IF THEN ELSE statement.

**Syntax**

The syntax for the nesting the IF function is:

\[
\text{IF}( \text{condition1}, \text{value}_1, \text{IF}( \text{condition2}, \text{value}_2, \text{value}_3 ))
\]

**Example**

Let's look at an example to see how you would use a nested IF and explore how to use the nested IF function as a worksheet function in Microsoft Excel:

Based on the Excel spreadsheet above, the following Nested IF examples would return:

\[
=\text{IF}(A1="10x12",120,\text{IF}(A1="8x8",64,\text{IF}(A1="6x6",36))))
\]

Result: 120

\[
=\text{IF}(A2="10x12",120,\text{IF}(A2="8x8",64,\text{IF}(A2="6x6",36))))
\]

Result: 64

\[
=\text{IF}(A3="10x12",120,\text{IF}(A3="8x8",64,\text{IF}(A3="6x6",36))))
\]

Result: 36
If there is an even number of values in a distribution, then there will be two middle values. **In that case the average of those two values is the median.**

The **Mode** is the most frequently occurring value. The mode of the distribution [3 5 7 5 6 8 9] is 5, because 5 occurs most frequently (twice, all other values occur only once).

### Measures of Variability Around the Mean

The **Variance** is the sum of squared deviations from the mean divided by \( N - 1 \). The variance for the distribution [3 5 7 5 6 8 9] (the same numbers used above to illustrate the mean) is: 

\[
\frac{(3-6.14)^2 + (5-6.14)^2 + (7-6.14)^2 + (5-6.14)^2 + (6-6.14)^2 + (8-6.14)^2 + (9-6.14)^2}{6} = 4.1429
\]

Variance is used mainly for **computational purposes**.

**Standard deviation** is the more commonly used measure of variability. The Standard deviation is the positive square root of the variance. For the distribution [3 5 7 5 6 8 9], the standard deviation is the square root of 4.1429, or 2.0354.

### Measures of Deviation from Normality

**Kurtosis** is a measure of the “peakedness” or the “flatness” of a distribution. A kurtosis value near zero (0) indicates a shape close to normal. A positive value for the kurtosis indicates a distribution more peaked than normal. A negative kurtosis indicates a shape flatter than normal. An extreme negative kurtosis (e.g., < −5.0) indicates a distribution where more of the values are in the tails of the distribution than around the mean. but a value between ±2.0 is in many cases also acceptable, depending on the particular application. Remember that these values are only guidelines. In other settings different criteria may arise, such as significant deviation from normality (outside ±2 × the standard error). Similar rules apply to skewness.
Skewness measures to what extent a distribution of values deviates from symmetry around the mean. A value of zero (0) represents a symmetric or evenly balanced distribution. A positive skewness indicates a greater number of smaller values (sounds backward, but this is correct). A negative skewness indicates a greater number of larger values. As with kurtosis, a skewness value between ±1.0 is considered excellent for most psychometric purposes, but a value between ±2.0 is in many cases also acceptable, depending on your application.

Measures of Size of the Distribution

For the distribution [3 5 7 5 6 8 9], the Maximum value is 9, the Minimum value is 3, and the Range is 9 − 3 = 6. The Sum of the scores is $3 + 5 + 7 + 5 + 6 + 8 + 9 = 43$. 
SPSS computes the Standard errors for the mean, the kurtosis, and the skewness. Standard error is designed to be a measure of stability or of sampling error. The logic behind standard error is this: If you take a random sample from a population, you can compute the mean, a single number. If you take another sample of the same size from the same population, you can again compute the mean—a number likely to be slightly different from the first number. If you collect many such samples, the standard error of the mean is the standard deviation of this sampling distribution of means. A similar logic is behind the computation of standard error for kurtosis or skewness. A small value (what is “small” depends on the nature of your distribution) indicates greater stability or smaller sampling error. the standard error formula is \[ SE = \frac{\sigma}{\sqrt{N}} \]

THE PURPOSE of crosstabulation is to show in tabular form the relationship between two or more categorical variables. Categorical variables include those in which distinct categories exist such as gender (female, male), place of residence (urban, suburban, rural), responses (yes, no), grades (A, B, C, D, F), and many more. Crosstabulation can be used with continuous data only if such data are divided into separate categories, such as age (0–19 years, 20–39 years, 40–59 years, 60–79 years, 80–99 years), total points (0–99, 100–149, 150–199, 200–250), and so on. While it is acceptable to perform crosstabulation with continuous data that has been categorized, it is rare to perform chi-square analyses with continuous data because a great deal of useful information about the distribution is lost by the process of categorization. For instance, in the total points distribution (above), two persons who scored 99 and 100 points, respectively, would be in the first and second categories and would be considered identical to two persons who scored 0 and 149 points, respectively. Nonetheless, crosstabulation with continuous data is often used for purposes of data description and display. The SPSS command Crosstabs and the
subcommands Cells and Statistics are used to access all necessary information about comparisons of frequency data.

**Crosstabulation**

Crosstabulation is a basic technique for examining the relationship between two categorical variables. For example, using Age category as a row variable and Gender as a column variable, you can create a two-dimensional crosstabulation that shows the number of males and females in each age category.

While the Frequencies command can tell us, for example, there are 5 persons with 6/6 sight, 2 persons with 12/6 sight and that there are 10 females and 11 males) in our `sight.sav` file, it cannot give us the number of females with 6/6 sight or males with 12/6 sight. This is the function of the Crosstabs command. It would be appropriate to “cross” two variables (sight by gender). This would produce a table of 12 different cells with frequencies inserted in each cell by crossing two (2) levels of gender with five (5) levels of sight. Note that it is possible to cross three or more variables.

**Chi-Square Test of Independence**

The Chi-Square Test of Independence determines whether there is an association between categorical variables (i.e., whether the variables are independent or related). This test is also known as Chi-Square Test of Association.

The test statistic for the Chi-Square Test of Independence is denoted $X^2$, and is computed as:

$$
X^2 = \sum_{i=1}^{R} \sum_{j=1}^{C} \frac{(o_{ij} - e_{ij})^2}{e_{ij}}
$$
Where:

\( o_{ij} \) is the observed cell count in the \( i_{th} \) row and \( j_{th} \) column of the table.

\( e_{ij} \) is the expected cell count in the \( i_{th} \) row and \( j_{th} \) column of the table, computed as:

\[
e_{ij} = \frac{\text{row } i \text{ total} \times \text{col } j \text{ total}}{\text{grand total}}
\]

DECISION AND CONCLUSIONS

Since the p-value (Asymptotic Significance (2-sided)) is greater than our chosen significance level (\( \alpha = 0.05 \)), we conclude that there is not enough evidence to suggest an association between gender and smoking.

Based on the results of the practical part of chi-square in spss, we can state the following:

No association was found between gender and smoking behavior \((X^2(2) > 1.667, p = 0.179)\).
AI-Noor University College
Computer for Medical Techniques Departments
2020 – 2021

BY: MUHAMMAD ABDELKARIM MUHAMMAD
Measures of Deviation from Normality

- Kurtosis is a measure of the “peakedness” or the “flatness” of a distribution.
- A kurtosis value near zero (0) indicates a shape close to normal.
- A positive value for the kurtosis indicates a distribution more peaked than normal.
- A negative kurtosis indicates a shape flatter than normal.
Measures of Deviation from Normality: Kurtosis
Measures of Deviation from Normality: Skewness

- Skewness measures to what extent a distribution of values deviates from symmetry around the mean.

- A value of zero (0) represents a symmetric or evenly balanced distribution.

- A positive skewness indicates a greater number of smaller values (sounds backward, but this is correct).

- A negative skewness indicates a greater number of larger values.
Measures of Deviation from Normality: Skewness
Measures of Size of the Distribution

For the distribution [3 5 7 5 6 8 9],

- the Maximum value is 9,
- the Minimum value is 3,
- and the Range is 9 − 3 = 6.

The Sum of the scores is 3 + 5 + 7 + 5 + 6 + 8 + 9 = 43.
Measures of Stability: Standard Error

SPSS computes the Standard errors for the mean, the kurtosis, and the skewness.

Standard error is designed to be a measure of stability or of sampling error.

The logic behind standard error is this: If you take a random sample from a population, you can compute the mean, a single number.

If you take another sample of the same size from the same population, you can again compute the mean—a number likely to be slightly different from the first number.

If you collect many such samples, the standard error of the mean is the standard deviation of this sampling distribution of means.

A small value (what is “small” depends on the nature of your distribution) indicates greater stability or smaller sampling error.
The standard error formula is

\[ SE = \frac{\sigma}{\sqrt{N}} \]
THE PURPOSE of crosstabulation is to show in tabular format the relationship between two or more categorical variables.

Categorical variables include those in which distinct categories exist such as gender (female, male), responses (yes, no), grades (A, B, C, D, F).

The SPSS command Crosstabs and the subcommands Cells and Statistics are used to access all necessary information about comparisons of frequency data.
Crosstabulation

Crosstabulation is a basic technique for examining the relationship between two categorical variables. For example, using Age category as a row variable and Gender as a column variable, you can create a two-dimensional crosstabulation that shows the number of males and females in each age category.
Chi-Square Test of Independence

The Chi-Square Test of Independence determines whether there is an association between categorical variables (i.e., whether the variables are independent or related). This test is also known as Chi-Square Test of Association.

The test statistic for the Chi-Square Test of Independence is denoted $\chi^2$, and is computed as:

$$\chi^2 = \sum_{i=1}^{R} \sum_{j=1}^{C} \frac{(o_{ij} - e_{ij})^2}{e_{ij}}$$
Chi-Square Test of Independence cont...

Where:

- \( o_{ij} \) is the observed cell count in the \( i \)th row and \( j \)th column of the table.
- \( e_{ij} \) is the expected cell count in the \( i \)th row and \( j \)th column of the table.

computed as:

\[
e_{ij} = \frac{\text{row } i \text{ total} \times \text{col } j \text{ total}}{\text{grand total}}
\]
### Observed Values

<table>
<thead>
<tr>
<th>Age</th>
<th>Football</th>
<th>swimming</th>
<th>walking</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15</td>
<td>25</td>
<td>10</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>15-30</td>
<td>8</td>
<td>55</td>
<td>22</td>
<td>85</td>
</tr>
<tr>
<td>30-60</td>
<td>6</td>
<td>24</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>89</td>
<td>72</td>
<td>200</td>
</tr>
</tbody>
</table>

هل نوع الرياضة مستقل عن العمر؟
### Example solution

**Expected Values**

<table>
<thead>
<tr>
<th>Age</th>
<th>Football</th>
<th>swimming</th>
<th>walking</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15</td>
<td>$\frac{(45\times39)}{200}$ =8.8</td>
<td>$\frac{(45\times89)}{200}$ =20</td>
<td>$\frac{(45\times72)}{200}$ =16.2</td>
<td>45</td>
</tr>
<tr>
<td>15-30</td>
<td>$\frac{(85\times39)}{200}$ =16.6</td>
<td>$\frac{(85\times89)}{200}$ =37.8</td>
<td>$\frac{(85\times72)}{200}$ =30.6</td>
<td>85</td>
</tr>
<tr>
<td>30-60</td>
<td>$\frac{(70\times39)}{200}$ =13.6</td>
<td>$\frac{(70\times89)}{200}$ =31.2</td>
<td>$\frac{(70\times72)}{200}$ =25.2</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>89</td>
<td>72</td>
<td>200</td>
</tr>
</tbody>
</table>

### Expected Values Formula

$$e_{ij} = \frac{\text{row } i \text{ total} \times \text{col } j \text{ total}}{\text{grand total}}$$

### Note

Notice that the sum of the expected frequencies equals the sum of the observed frequencies for any row or column.
Example solution cont.

**chi Value**

$$
\chi^2 = \sum_{i=1}^{R} \sum_{j=1}^{C} \frac{(o_{ij} - e_{ij})^2}{e_{ij}}
$$

$$
X^2 = \sum_{i=1}^{R} \sum_{j=1}^{C} \frac{(O_{ij})^2}{e_{ij}} - \text{total}
$$

$$
X^2 = \frac{25^2}{8.8} + \frac{10^2}{20} + \ldots + \frac{40^2}{25.2} = 266.6 - 200
$$

$$
X^2 = 66.6
$$
Example solution cont.

\[ X^2 = 66.6 \]

Degree of Freedom (df) = (rows – 1) * (columns – 1) = (3-1)*(3-1) = 4

Chosen significance level (\( \alpha = 0.05 \)) note that (0.01) can be used also

Using the df & \( \alpha \) & the table below we find that \( P \) (critical value) = 9.488

<table>
<thead>
<tr>
<th>Degrees ofFreedom</th>
<th>0.995</th>
<th>0.99</th>
<th>0.975</th>
<th>0.95</th>
<th>0.90</th>
<th>0.10</th>
<th>0.05</th>
<th>0.025</th>
<th>0.01</th>
<th>0.005</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.001</td>
<td>0.004</td>
<td>0.016</td>
<td>2.706</td>
<td>3.841</td>
<td>5.024</td>
<td>6.635</td>
<td>10.827</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.020</td>
<td>0.051</td>
<td>0.211</td>
<td>4.605</td>
<td>5.991</td>
<td>7.779</td>
<td>9.210</td>
<td>10.587</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.072</td>
<td>0.116</td>
<td>0.652</td>
<td>6.251</td>
<td>7.815</td>
<td>9.348</td>
<td>11.565</td>
<td>12.838</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.207</td>
<td>0.297</td>
<td>0.871</td>
<td>1.694</td>
<td>2.777</td>
<td>3.841</td>
<td>5.024</td>
<td>6.635</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.412</td>
<td>0.554</td>
<td>0.831</td>
<td>1.610</td>
<td>1.694</td>
<td>5.991</td>
<td>7.779</td>
<td>8.888</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.676</td>
<td>0.872</td>
<td>1.237</td>
<td>1.635</td>
<td>2.204</td>
<td>6.635</td>
<td>10.827</td>
<td>14.449</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.839</td>
<td>1.233</td>
<td>1.690</td>
<td>2.187</td>
<td>2.833</td>
<td>12.017</td>
<td>14.686</td>
<td>16.113</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1.204</td>
<td>1.646</td>
<td>2.102</td>
<td>2.833</td>
<td>3.567</td>
<td>17.275</td>
<td>18.591</td>
<td>20.180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1.735</td>
<td>2.058</td>
<td>2.700</td>
<td>3.325</td>
<td>4.166</td>
<td>19.023</td>
<td>21.666</td>
<td>23.558</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>3.074</td>
<td>3.571</td>
<td>4.404</td>
<td>5.226</td>
<td>6.304</td>
<td>23.542</td>
<td>29.837</td>
<td>32.537</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>3.555</td>
<td>4.097</td>
<td>5.009</td>
<td>5.892</td>
<td>7.042</td>
<td>25.360</td>
<td>32.253</td>
<td>34.900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>4.075</td>
<td>4.600</td>
<td>5.669</td>
<td>6.571</td>
<td>7.790</td>
<td>27.177</td>
<td>34.670</td>
<td>37.281</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>5.142</td>
<td>5.812</td>
<td>6.908</td>
<td>7.942</td>
<td>9.312</td>
<td>30.810</td>
<td>39.550</td>
<td>42.079</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>5.697</td>
<td>6.408</td>
<td>7.564</td>
<td>8.672</td>
<td>10.085</td>
<td>32.627</td>
<td>41.994</td>
<td>44.496</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>6.263</td>
<td>7.015</td>
<td>8.231</td>
<td>9.390</td>
<td>10.865</td>
<td>34.443</td>
<td>44.438</td>
<td>46.918</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>8.034</td>
<td>8.897</td>
<td>10.283</td>
<td>11.591</td>
<td>13.260</td>
<td>40.890</td>
<td>51.765</td>
<td>54.244</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>11.160</td>
<td>12.208</td>
<td>13.844</td>
<td>15.379</td>
<td>17.156</td>
<td>50.958</td>
<td>63.967</td>
<td>66.633</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>27.991</td>
<td>29.070</td>
<td>32.387</td>
<td>34.664</td>
<td>37.889</td>
<td>63.167</td>
<td>67.058</td>
<td>71.420</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>35.534</td>
<td>37.485</td>
<td>40.482</td>
<td>43.138</td>
<td>46.459</td>
<td>74.307</td>
<td>79.082</td>
<td>83.288</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>43.275</td>
<td>45.442</td>
<td>48.759</td>
<td>51.760</td>
<td>55.320</td>
<td>85.327</td>
<td>91.023</td>
<td>95.023</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>51.125</td>
<td>53.640</td>
<td>58.327</td>
<td>60.273</td>
<td>64.273</td>
<td>96.347</td>
<td>101.425</td>
<td>104.125</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Example solution cont.

DECISION AND CONCLUSIONS

Since $X^2 = 66.6$ is greater than the found Value in the table = 9.488

we conclude that there is enough evidence to suggest an association between Sport and Age.

<table>
<thead>
<tr>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>66.664a</td>
<td>4</td>
<td>0.000</td>
</tr>
</tbody>
</table>

$\chi^2(4) = 66.664a \ , \ P = 0.000$
Crosstabulation and X2 Analyses in SPSS.
Crosstabulation and X2 Analyses in SPSS cont...

### Crosstabulation

<table>
<thead>
<tr>
<th>Type of Exercise</th>
<th>&lt;15</th>
<th>15-30</th>
<th>31-60</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football</td>
<td>25</td>
<td>8</td>
<td>6</td>
<td>39</td>
</tr>
<tr>
<td>Expected Count</td>
<td>8.8</td>
<td>16.6</td>
<td>13.7</td>
<td>39.0</td>
</tr>
<tr>
<td>Swimming</td>
<td>10</td>
<td>55</td>
<td>24</td>
<td>89</td>
</tr>
<tr>
<td>Expected Count</td>
<td>20.0</td>
<td>37.8</td>
<td>31.2</td>
<td>90.0</td>
</tr>
<tr>
<td>Walking</td>
<td>10</td>
<td>22</td>
<td>40</td>
<td>72</td>
</tr>
<tr>
<td>Expected Count</td>
<td>16.2</td>
<td>36.0</td>
<td>25.2</td>
<td>72.0</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>85</td>
<td>70</td>
<td>200</td>
</tr>
<tr>
<td>Expected Count</td>
<td>45.0</td>
<td>65.0</td>
<td>70.0</td>
<td>200.0</td>
</tr>
</tbody>
</table>

### Chi-Square Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>66.664</td>
<td>4</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>58.401</td>
<td>4</td>
<td>.000</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>33.935</td>
<td>1</td>
<td>.000</td>
</tr>
</tbody>
</table>

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.78.

Bar Chart

- Football
- Swimming
- Walking
Thank You
Al-Noor University College

Computer for Medical Departments

By: Muhammad A. Muhammad

2021 - 2022
Microsoft Office PowerPoint 2010

PowerPoint: PowerPoint is a slideshow presentation program that's part of the Microsoft office suite, it makes it easy to create and present your ideas in dynamic, visually interesting ways.

Getting Started with Microsoft PowerPoint 2010

You open Microsoft PowerPoint by clicking on the icon on your desktop (if you have one there) or by going to start → all programs → Microsoft office → PowerPoint.

When you click on the icon, a blank slide will open. This is a new slide for which the default name is Presentation1. For each additional new document that you open, the name increases by one digit: Presentation2, Presentation3, etc. If you start MS PowerPoint by clicking on an already existing presentation on your computer, it will open automatically, and your presentation will be displayed in the MS PowerPoint window.
In this lesson we explain many commands of Microsoft PowerPoint 2010 interface.

**File menu contain**

1- Save: to save the presentation after any change.
2- Save as: to save the presentation with another name, place, type.
3- Open: to open a presentation, that was saved in the computer.
4- Recent: reach to the recent presentations, that were opened recently.
5- New: create a new presentation from the available templates.
6- Print: configure to print.

**Print**

1- Copies: number of copies
2- Printer: choose the printer
3- Setting
   a. print all slides or print current slide or printing a custom range of slides.
   b. Full page slide, 1 slide per sheet, 2 slides per sheet, 4 pages per sheet, etc.
   c. Colored printing or black and white printing
Home TAB

Clipboard group
- Cut: - cut the selection and put it on the clipboard
- Copy: - copy the selection and put it on the clipboard
- Format painter: - copy information from one place and apply it to another
- Paste: - paste the contents of the clipboard.
- From left to right
  1- Keep source formatting
  2- Merge formatting
  3- Copy text only

Font Group
1) Choose font type
2) Choose font size
3) Choose font size
   a. Grow font (increase the size)
   b. Shrink font (decrease the size)
4) B :- make the selected text bold (CTRL + B)
5) I :- Italic (CTRL + I)
6) U :- underline the selected text. (CTRL + U)
7) S: add shadow behind the selected text.
8) abc: draw a line through the middle of the selected text.
9) AV : increase or decrease the spacing between characters.
10) Aa: change the case of the text from many options
11) Make the text look like it was marked by highlight color.
12) choose the text color.
13) A : clear formatting from the selected text.
**Paragraph Group**

1. Start a bulleted list
2. Start a numbered list
3. Increase or decrease the indent
4. Line spacing: choose the spacing between lines of text
5. Text direction: the direction of the text (horizontal, rotated by degree, stacked).
6. Align text (left, middle, right, justify)
7. Align text (Top, Middle, bottom).

**Slides Group**

New slide: add a slide to the presentation or duplicate an existing slide (CTRL + M)

Layout: change the layout of the current slide

Section: add a new section to the presentation, rename it, remove it, collapse all sections or expand them all.

**Drawing Group**

1. **Shapes:** adding many different shapes to the presentation like (lines, ellipse, square, circle, etc.)
2. **arrange:**
   a. **Group:** after selecting a shape, the group option will be inactive until you select another shape by pressing CTRL keyboard button then left clicking the second shape.
   b. **Ungrouping:** to ungroup an already grouped shapes select the grouped shapes then arrange ➔ group objects ➔ ungroup.
   c. **Order objects:** to rearrange a shape select it then use arrange ➔ order objects ➔ (bring to front, send to back, bring forward, send backward).
Drawing Group (cont...)

3- **Shape fill**: fill the selected shape with solid color or gradient.
4- **Shape outline**: select the desired color and line width for the outline of the selected shape.
5- **Shape effects**: apply an effect to the selected text such as glow, shadow, etc.

Object order example

- **A in front of B**
- **B in front of A**

Example of a textbox with blue fill and black outline of width 2.25 pt. and blue glow and 3D rotation.

Hello my name is Muhammed I am the computer teacher at Alnoor University College...

Editing Group

- **Find**: - Find text in the presentation.
- **Replace**: - replace text in the presentation.
- **Select**: - select text or objects in the presentation.
  - **Select all**: - select everything in the presentation.
  - **Select objects**: - a very useful tool to select objects behind text.
  - **Selection pane**: a pane that display all the objects in the presentation, useful for selection or reordering.
5- **SQRT(number):** Returns a positive square root.

6- **MOD(number, divisor):** Returns the remainder after number is divided by divisor. The result has the same sign as divisor.

### Paste Options

Copying and Pasting data is one of the most performed actions in Excel. There is a lot more to copy-pasting than simple Control + C and Control + V, this example illustrates the various paste options in Excel. Cell B5 below contains the SUM function which calculates the sum of the range B2:B4. Furthermore, we changed the background color of this cell to yellow and added borders.

**A- Paste:** The Paste option pastes everything.
1. Select cell B5, right click, and then click Copy (or press CTRL + C).
2. Next, select cell F5, right click, and then click Paste under 'Paste Options:' (or CTRL + V).

**B- Values:** The Values option pastes the result of the formula.
a. Select cell B5, right click, and then click Copy (or press CTRL + C).
b. Next, select cell D5, right click, and then click Values under 'Paste Options:'

**C- Formulas:** the formula option only pastes the formula.
a. Select cell B5, right click, and then click Copy (or press CTRL + C).
b. Next, select cell F5, right click, and then click Formulas under 'Paste Options:'

---

<table>
<thead>
<tr>
<th>A5</th>
<th>B5</th>
<th>C5</th>
<th>D5</th>
<th>E5</th>
<th>F5</th>
<th>G5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>=SUM(B2:B4)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
D- Formatting: The Formatting option only pastes the formatting.
   a. Select cell B5, right click, and then click Copy (or press CTRL + C).
   b. Next, select cell D5, right click, and then click Formatting under 'Paste Options:'

Note: The Format Painter copy/pastes formatting even quicker.

E- Paste Special: The Paste Special dialog box offers many more paste options. To launch the Paste Special dialog box, execute the following steps.
   a. Select cell B5, right click, and then click Copy (or press CTRL + c).
   b. Next, select cell D5, right click, and then click Paste Special.

Paste Special - Operations.
Operations options give you a quick way to perform the given operations without applying a formula or directly changing the cell contents.

Skip Blanks: This would skip copying and pasting the blanks. A practical use if this could be when you have data split into 2 columns and you want to combine it in a single column.

Transpose: As the name suggests, if this is checked, it transposes the data when you paste it.
Al-Noor University College

Computer for Medical Techniques Departments

2020 – 2021

By: Muhammad Abdelkarim Muhammad

IBM

SPSS
Introduction

SPSS (Statistical Package for the Social Sciences) has now been in development for more than thirty years. Originally developed as a programming language for conducting statistical analysis, it has grown into a complex and powerful application with now uses both a graphical and a syntactical interface and provides dozens of functions for managing, analyzing, and presenting data.

The following lessons provide methods to learn your way around the program, exploring the various functions for managing your data, conducting statistical analyses, creating tables and charts, and preparing your output for incorporation into external files such as spreadsheets and word processors. Most importantly, you’ll learn how to learn more about SPSS.

**SPSS V.S. EXCEL:** -

<table>
<thead>
<tr>
<th>NO.</th>
<th>SPSS</th>
<th>EXCEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>statistical analysis software.</td>
<td>spreadsheet software</td>
</tr>
<tr>
<td>2</td>
<td>but SPSS is more powerful. SPSS has built-in data manipulation tools such as recoding, transforming variables, and in Excel, you have a lot of work if you want to do that job.</td>
<td>perform some Statistical analysis</td>
</tr>
<tr>
<td>3</td>
<td>SPSS allows you to perform complex analytics such as factor analysis, logistic regression, cluster analysis etc.</td>
<td>perform Simple analytics</td>
</tr>
<tr>
<td>4</td>
<td>every column is one variable</td>
<td>Excel does not treat columns and rows in that way.</td>
</tr>
<tr>
<td>5</td>
<td>number of variables and observations is not a problem.</td>
<td>starts becoming unwieldy to use when the number of variables and observations starts getting large.</td>
</tr>
<tr>
<td>6</td>
<td>serve you the purpose in their domains exceptionally</td>
<td></td>
</tr>
</tbody>
</table>
SPSS v26 Main Interface: - The simple interface of the SPSS 26 is illustrated below.

TOOLBAR: - The toolbar icons are located below the menu bar at the top of the screen. The icons were created specifically for ease of point-and-click mouse operations.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Function</th>
<th>Icon</th>
<th>Function</th>
<th>Icon</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="folder.png" alt="Folder" /></td>
<td>Click this to open a file</td>
<td><img src="magnifying_glass.png" alt="Magnifying Glass" /></td>
<td>Find data</td>
<td><img src="plus_folder.png" alt="Folder with plus sign" /></td>
<td>(upper left corner) the “+” sign indicates that this is the active file</td>
</tr>
<tr>
<td><img src="save.png" alt="Save" /></td>
<td>Save current file</td>
<td><img src="table.png" alt="Table" /></td>
<td>Insert subject or case into the data file</td>
<td><img src="trash_can.png" alt="Trash Can" /></td>
<td>Shifts between numbers and labels for variables with several levels</td>
</tr>
<tr>
<td><img src="print.png" alt="Print" /></td>
<td>Print file</td>
<td><img src="insert_variable.png" alt="Insert New Variable" /></td>
<td>Insert new variable into the data file</td>
<td><img src="split.png" alt="Split" /></td>
<td>Go to a particular variable or case number</td>
</tr>
<tr>
<td><img src="recall.png" alt="Recall" /></td>
<td>Recall a recently-used command</td>
<td><img src="split_subgroups.png" alt="Split into Subgroups" /></td>
<td>Split file into subgroups</td>
<td><img src="add_all.png" alt="Add Variables or All Variables" /></td>
<td>Use subsets of variables/use all variables</td>
</tr>
<tr>
<td><img src="undo.png" alt="Undo" /></td>
<td>Undo the last operation</td>
<td><img src="weight.png" alt="Weight" /></td>
<td>Weight cases</td>
<td><img src="select.png" alt="Select" /></td>
<td>Access information about the current variable</td>
</tr>
<tr>
<td><img src="redo.png" alt="Redo" /></td>
<td>Redo something you just undid</td>
<td><img src="select_cases.png" alt="Select Cases" /></td>
<td>Select cases</td>
<td><img src="spell_check.png" alt="Spell Check" /></td>
<td>Spell check</td>
</tr>
</tbody>
</table>

SPSS v26 Tool bar icons

It must be noted that even in SPSS applications the format of the icon bar may vary slightly. The toolbar shown above applies to the data editor window; a different tool-
bar is available that applies to the output window. Also note that some of the icons are bright and clear and others are “grayed.” Grayed icons are those that are not currently available. Note, for instance, that the Print File icon is grayed because there are no data to print. When data are entered into the data editor, then these icons become clear because they are now available. The best way to learn how the icons work is to click on them and see what happens.

**THE MENU BAR** The menu bar (just above the toolbar) displays the commands that perform most of the operations that SPSS provides. You will become well acquainted with these commands as you spend time with SPSS. Whenever you click on a particular command, a series of options appears below, and you will select the one that fits your need. The commands are now listed and briefly described:

- **File**: Deals with different functions associated with files, including opening, reading, and saving, as well as exiting SPSS.
- **Edit**: Several editing functions, including copying, pasting, finding, and replacing.
- **View**: Several options that affect the way the screen appears; the option most frequently used is **Value Labels**.
- **Data**: Operations related to defining, configuring, and entering data; also deals with sorting cases, merging, or aggregating files, and selecting or weighting cases.
- **Transform**: Transformation of previously entered data, including recoding, computing new variables, reordering, and dealing with missing values.
- **Analyze**: All forms of data analysis begin with a click of the Analyze command.
- **Graphs**: Creation of graphs or charts can begin either with a click on the Graphs command or (often) as an option while other statistics are being performed.
- **Utilities**: Utilities deals largely with sophisticated ways of making complex data operations easier. Most of these commands are for advanced users.
• **Add-ons:** If you want to do advanced statistics that aren’t already in SPSS, these menu options will direct you to other programs and services that SPSS can sell you.

• **Window:** Deals with the position, status, and format of open windows. This menu may be used instead of the taskbar to change between SPSS windows.

• **Help:** A truly useful aid with search capabilities, tutorials, and a statistics coach that can help you decide what type of SPSS procedure to use to analyze your data.

### The Output Window

“Output” is the term used to identify the results of the previous analyses. It is the objective of all data analysis. SPSS has a long history of efforts to create a format of output that is clear yet comprehensive. The current version uses a tables-with-borders format. When utilizing options described below, this is relatively clear, but output can still be awkward and occupy many pages.
One of the most important things to learn about the SPSS output window is the use of the outline view on the left of the screen. On the right side of the window is the output from the SPSS procedures that were run, and on the left is the outline (like a table of contents without page numbers) of that output. The SPSS output is composed of a series of output objects; these objects may be titles (e.g., “Frequencies”), tables of numbers, or charts, among other things. Each of these objects is listed in the outline view.

You will notice that there is no “Notes” section in the output window to correspond with the “Notes” title in the outline view. That’s because the notes are (by default) hidden. If you want to see the notes, double click on the word “Notes” and they will appear. The closed-book icon will then become an open-book icon and the notes will materialize in the window to the right. Double click on the word “Notes” in the outline view again and the notes will disappear, and the book will close.
SPSS Views: The two screens serve distinct and complementary purposes: **Data View** is designed to enter data after the data file has been created. **Variable View** is designed to name, label, and determine specifications for each variable.
Variables in SPSS: - for each variable in SPSS there are “Specifications”, those specifications are detailed as follows.

Name: Beginning with the variable view screen, simply type the names of your variables one at a time in the first column. After a name is typed, you may use the cursor keys or the tab to move to the next cell to type the next variable name.

Type: When you click on a cell in any row under Type you notice a small, grayed box to the right of the word Numeric. A click on the box opens Variable Type Window

Notice that Numeric is selected. Most of your variables will be numeric and you will retain the default setting.

A variable that contains letters (rather than only numbers) is called a String variable.

Decimals: The function of the Decimal column is to identify the number of decimal places for each variable.

Width: In the Width column you determine the largest number or longest string that will occur for each variable.

Label: The Label column allows you to label any variable whose meaning is not clear from the variable name. Many times, the meaning is clear from the variable name itself (e.g., id, gender, quiz1, quiz2) and no label is required. Other times the meaning is NOT clear, and a label is very useful. After an analysis, in the Output section, an Options selection will allow the label to be listed instead of the variable name to assist in clarity and interpretation. The maximum length is 256 characters.

Values: Value labels allow you to identify levels of a variable (e.g., gender: 1 = female, 2 = male; marital: 1 = married, 2 = single, 3 = divorced, 4 = widowed). Entering value labels for variables that have several distinct groups is critical for clarity in interpretation of output.
Just like the **Type** option, a click on any cell in the **Values** column will produce the small, grayed box. A click on this box will produce the “Value Labels” Window dialog box that will allow you to create value labels.

**Missing:** The **Missing** column is rarely used. Its purpose is to designate different types of missing values in your data. For instance, subjects who refused to answer the marital question.

**Columns:** the width of each column in the data view tab.

**Align:** The **Align** column provides a drop-down menu that allows you to align the data in each cell right, left, or center. By default, numeric variables align to the right, string variables align to the left. You may select otherwise if you wish.

**Measure:**

The **Measure** column also provides a drop-down menu that allows you to select three options based on the nature of your data: **Scale**, **Ordinal**, and **Nominal**.

- **Scale** measures have fundamental numeric meaning that allow typical mathematical manipulations. For instance, age is a scale variable: 16 is twice as much as 8, 4 is half as much as 8, the sum of a 4 and 8 is 12, and so forth. **Scale** is the default for all numeric variables.

- **Ordinal** measures have fundamental order, but mathematical manipulations are typically meaningless like the age groups (10 – 20, 20-30, …) or the satisfaction level (strongly agree, agree, disagree, strongly disagree).

- **Nominal** measures are used for identification but have no fundamental order (lesser to greater) such as gender, ethnicity, marital status, yes/no questions, and most string variables. Nominal data may be used for categorization and for several other statistical procedures.
Sometimes it can be difficult to choose between scale and ordinal. If so, don’t worry too much. In all analysis, SPSS handles both ordinal and scale variables identically.

**Role:** The **Role** column is designed for large data sets in which the researcher wishes to keep track of which variables are independent variables (**Input**, the default), which are dependent (**Target**), and other functions unique to certain designs. For most studies this column may be ignored.
Sometimes it can be difficult to choose between scale and ordinal. If so, don’t worry too much. In all analysis, SPSS handles both ordinal and scale variables identically.

**Role:** The **Role** column is designed for large data sets in which the researcher wishes to keep track of which variables are independent variables (**Input**, the default), which are dependent (**Target**), and other functions unique to certain designs. For most studies this column may be ignored.

**Entering Data:** After naming and formatting the variables, entering data is a simple process.

**ENTER DATA BY VARIABLE:** Click on the first empty cell under the first variable, type the number (or word), press the Down-arrow key, or Enter key, then type the next number/word, press the Down-arrow, or Enter key, and so forth. When you finish one variable, scroll to the top of the file, and enter data for the next variable in the same way.

**ENTER DATA BY CASE OR PARTICIPANT:** Click on the first empty cell for the first subject under the first variable, and then type the first number/word, press the Right arrow key or Tab key, type the next number, press the Right-arrow or Tab key, and so forth. When you finish one participant, scroll back to the first column, and enter data for the next participant.

**Editing Data:** Just as data entry is a simple procedure, so also is editing previously entered data. The following options are available:

**CHANGING A CELL VALUE** Simply click on the cell of interest, type the new value, and then hit Enter, Tab, or any of the Arrow keys.

**INSERTING A NEW CASE** If you wish to insert data for a new subject or case, click on the case number above which you would like the new case to be. Then click on
the insert case toolbar icon ( ) and a new line will open and push all other cases down by exactly one line. You may then enter data for the new subject or case.

**INSERTING A NEW VARIABLE:** To insert a new variable, click on the variable to the right of where you would like the new variable to be located, click on the insert-variable icon ( ), and a new column will open (to the left) and push all other variables exactly one column to the right. You may then name and format the new variable and enter data in that column.

**TO SEARCH FOR DATA:** One of the handiest editing procedures is the Find function. A click on the Edit command followed by a click on the Find option (or a click on the toolbar icon) opens up a screen that allows you to search for a particular word or data value, note that CTRL + F can be used also.

**MAKING PARTICIPANT IDENTIFIERS ALWAYS VISIBLE** When a file has many variables, it is often useful to make some of the columns (those on the left) always visible, even when you are scrolling over to view or enter variables along the right. This is easy to do once you find where to put the cursor. Near the bottom right of the screen, look for a small area to the right of the vertical scroll bar. Drag that line to the left, until it is immediately to the right of any variables you want to always be visible.

**Variable Types:** For your data analysis to be accurate, it is imperative that you correctly identify the type and formatting of each variable. SPSS has special restrictions in place so that statistical analyses can't be performed on inappropriate types of data.
Information for the type of each variable is displayed in the **Variable View** tab. Under the “Type” column, simply click the cell associated with the variable of interest. A blue “…” button will appear.

Click this and the Variable Type window will appear. You can use this dialog box to define the type for the selected variable, and any associated information (e.g., width, decimal places).

The two common types of variables that you are likely to see are **numeric** and **string**.

**NUMERIC**

Numeric variables, as you might expect, have data values that are recognized as numbers. This means that they can be sorted numerically or entered into arithmetic calculations. When viewed in the Data View window, system-missing values for numeric variables will appear as a dot (i.e., “.”). (Note that one should not type in a period character in a cell to specify a missing value. Simply leave the cell blank, and SPSS will recognize it as system-missing.)

**STRING**

String variables -- which are also called alphanumeric variables or character variables have values that are treated as text. This means that the values of string variables may include numbers, letters, or symbols. In the Data View window, missing string values will appear as blank cells. However, note that these blank cells are not recognized by SPSS as system-missing values (i.e., SPSS considers even blank strings to be non-missing)! This has important implications if you plan to use a string variable in an analysis, since it will affect your sample size.
COMMA

Numeric variables that include commas that delimit every three places (to the left of the decimals) and use a period to delimit decimals. SPSS will recognize these values as numeric even if they contain commas or use scientific notation.

- Example: Thirty-thousand and one half: 30,000.50
- Example: One million, two hundred thirty-four thousand, five hundred sixty-seven and eighty-nine hundredths: 1,234,567.89

DOT

Numeric variables that include periods that delimit every three places and use a comma to delimit decimals. SPSS will recognize these values as numeric even if they contain periods or use scientific notation.

- Example: Thirty-thousand and one half: 30.000,50
- Example: One million, two hundred thirty-four thousand, five hundred sixty-seven and eighty-nine hundredths: 1.234.567,89

DATE

Numeric variables that are displayed in any standard calendar date or clock-time formats. Standard formats may include commas, blank spaces, hyphens, periods, or slashes as space delimiters.

- Example: Dates: 01/31/2013, 31.01.2013
- Example: Time: 01:02:33.7

DOLLAR

Numeric variables that contain a dollar sign (i.e., $) before numbers. Commas may be used to delimit every three places, and a period can be used to delimit decimals.

- Example: Thirty-three thousand dollars and thirty-three cents: $33,000.33
- Example: One million dollars and twelve point three cents: $1,000,000.123
Descriptive statistics is a **summary statistic** that quantitatively **describes or summarizes features** from a collection of information, they are designed to give you information about the distributions of your variables. Within this broad category are measures of central tendency (**Mean, Median, Mode**), measures of variability around the mean (**Std deviation and Variance**), measures of deviation from normality (**Skewness and Kurtosis**), information concerning the spread of the distribution (**Maximum, Minimum, and Range**), and information about the stability or sampling error of certain measures, including standard error (**S.E.** of the mean (**S.E. mean**), S.E. of the kurtosis, and S.E. of the skewness (included by default when skewness and kurtosis are requested).

**The Normal Distribution**

Many naturally occurring phenomena produce distributions of data that approximate a normal distribution. Some examples include the height of adult humans in the world and the IQs of residents of Iraq. In all these distributions, there are many midrange values (e.g., 153–178 centimeters, 90–110 IQ points) and few extreme values (e.g., 76 centimeters, 12 IQ points).

There are other distributions that approximate normality but deviate in predictable ways. For instance, times of runners in a 10-kilometer race will have few values less than 30 minutes, but many values greater than 40 minutes. The majority of values will lie above the mean (average) value. This is called a **negatively skewed distribution**. Then there is the distribution of ages of persons living in Iraq. While there are individuals who are 1 year old and others who are 100 years old, and in general the population has more values below the mean than above the mean. This is called a **positively skewed distribution**.

A normal distribution is symmetric about the mean or average value. In a normal distribution, 68% of values will lie between plus-or-minus (±) 1 standard deviation (described below) of
the mean, 95.5% of values will lie between $\pm 2$ standard deviations of the mean, and 99.7% of values will lie between $\pm 3$ standard deviations of the mean. A normal distribution is illustrated in the figure below.

![Normal Distribution](image)

As a final example the average (or mean) height of an American adult male is centimeters with a standard deviation of 4 inches. Thus, 68% of American men are between 162.5cm and 185.5cm ($69 \pm 4$); 95.5% of American men are between 155cm and 195.5cm ($69 \pm 8$), and 99.7% of American men are between 145 and 206 ($69 \pm 12$) in height.

**Measures of Central Tendency**

The **Mean** is the average value of the distribution, or the sum of all values divided by the number of values. The mean of the distribution $[3 \ 5 \ 7 \ 5 \ 6 \ 8 \ 9]$ is: $(3 + 5 + 7 + 5 + 6 + 8 + 9)/7 = 6.14$

The **Median** is the middle value of the distribution. The median of the distribution $[3 \ 5 \ 7 \ 5 \ 6 \ 8 \ 9]$, is 6, the middle value (when reordered from small to large, $3 \ 5 \ 5 \ 6 \ 7 \ 8 \ 9$).
If there is an even number of values in a distribution, then there will be two middle values. **In that case the average of those two values is the median.**

The **Mode** is the most frequently occurring value. The mode of the distribution [3 5 7 5 6 8 9] is 5, because 5 occurs most frequently (twice, all other values occur only once).

### Measures of Variability Around the Mean

The **Variance** is the sum of squared deviations from the mean divided by \(N - 1\). The variance for the distribution [3 5 7 5 6 8 9] (the same numbers used above to illustrate the mean) is:

\[
\frac{(3-6.14)^2 + (5-6.14)^2 + (7-6.14)^2 + (5-6.14)^2 + (6-6.14)^2 + (8-6.14)^2 + (9-6.14)^2}{6} = 4.1429
\]

Variance is used mainly for **computational purposes**.

**Standard deviation** is the more commonly used measure of variability. The Standard deviation is the positive square root of the variance. For the distribution [3 5 7 5 6 8 9], the standard deviation is the square root of 4.1429, or 2.0354.
Al-Noor University College
Computer for Medical Techniques Departments
2020 – 2021

POWERP
OINT
BY: MUHAMMAD A. MUHAMMAD
PowerPoint.

- PowerPoint is a slideshow presentation program that's part of the Microsoft office suite, it makes it easy to create and present your ideas in dynamic, visually interesting ways.

- You open Microsoft PowerPoint by clicking on the icon on your desktop (if you have one there) or by going to start > all programs > Microsoft office > PowerPoint.
File TAB.

File menu contain

1. Save: to save the presentation after any change.
2. Save as: to save the presentation with another name, place, type.
3. Open: to open a presentation, that was saved in the computer.
4. Recent: reach to the recent presentations, that were opened recently.
5. New: create a new presentation from the available templates.
6. Print: configure to print.
Print

1. Copies: number of copies
2. Printer: choose the printer
3. Setting
   a. print all slides or print current slide or printing a custom range of slides.
   b. Full page slide, 1 slide per sheet, 2 slides per sheet, 4 pages per sheet, etc.
   c. Colored printing or black and white printing
Home TAB.

Clipboard group
- Cut: - cut the selection and put it on the clipboard
- Copy: - copy the selection and put it on the clipboard
- Format painter: - copy information from one place and apply it to another
- Paste: - paste the contents of the clipboard.
  1. Keep source formatting.
  2. Merge formatting.
  3. Copy text only.
Home TAB cont...

Font Group
1) Choose font type
2) Choose font size
3) Choose font size
   a. Grow font (increase the size)
   b. Shrink font (decrease the size)
4) B :- make the selected text bold (CTRL + B)
5) I :- Italic (CTRL + I)
6) U :- underline the selected text. (CTRL + U)
7) S : add shadow behind the selected text.
8) abc:- draw a line through the middle of the selected text.
9) AV : increase or decrease the spacing between characters.
10) Aa: change the case of the text from many options
11) Make the text look like it was marked by highlight color.
12) choose the text color.
13) A : clear formatting from the selected text.
Slides Group.

**Slides Groups**

- New slide: add a slide to the presentation or duplicate an existing slide (CTRL + M)
- Layout: change the layout of the current slide
- Section: add a new section to the presentation, rename it, remove it, collapse all sections or expand them all.
Paragraph Group

1. Start a bulleted list
2. Start a numbered list
3. Increase or decrease the indent
4. Line spacing: choose the spacing between lines of text
5. Text direction: the direction of the text (horizontal, rotated by degree, stacked).
6. Align text (left, middle, right, justify)
7. Align text (Top, Middle, bottom).
Thank You
Al-Noor University College

Computer for Medical Departments

2022 – 2023

By: Muhammad Abdelkarim Muhammad
Microsoft Office Excel 2010

Excel 2010 is a spreadsheet program included in the Microsoft Office suite, it present tables of values arranged in rows and columns that can be manipulated using both basic and complex arithmetic operations (formulas) and functions.

Running The application

To Run Excel program use: start → all program → Microsoft office → Microsoft Excel
Or you can search for it by typing “excel 2010” in the search box of the start menu.

Eight Benefits of Microsoft Excel

1. Very good way to store data.
2. Easily perform calculations.
3. Variety of tools for data analysis.
4. Easy data visualizations with charts.
5. Easily print reports.
6. So many free templates to use.
7. Coding (using VBA) to automate.
8. Use excel online & excel mobile app.

Six Excel Features

1. Conditional Formatting.
2. PivotTables.
3. Paste Special.
4. Add Multiple Rows/columns.
5. Extend formula across/down.
**Excel 2010 Main Interface Contents:** Excel 2010 comes with a new user interface called the Ribbon, which consists of a series of horizontal tabs, each containing a variety of commands grouped according to function. Most features in Excel 2010 are available through the commands on the Ribbon tabs. In addition, the Ribbon can be customized in Excel 2010. Below figure shows a typical Excel 2010 user interface, with the important parts labeled.

**The Ribbon:** The Ribbon is designed to help you quickly find the commands that you need to complete a task. Commands are organized in logical groups, which are collected together under tabs. Each tab relates to a type of activity, such as formatting or laying out a page. To reduce clutter, some tabs are shown only when needed. For example, the Picture Tools tab is shown only when a picture is selected.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active cell indicator</strong></td>
<td>This dark outline indicates the currently active cell (user selected cell).</td>
</tr>
<tr>
<td><strong>Application Close button</strong></td>
<td>Clicking this button closes Excel.</td>
</tr>
<tr>
<td><strong>Application Minimize button</strong></td>
<td>Clicking this button minimizes the Excel window.</td>
</tr>
<tr>
<td><strong>Column letters</strong></td>
<td>Letters range from A to XFD — one for each of the 16,384 columns in the worksheet. You can click a column heading to select an entire column of cells or drag a column border to change its width.</td>
</tr>
<tr>
<td><strong>Expand formula bar button</strong></td>
<td>Clicking this button expand formula bar to display more.</td>
</tr>
<tr>
<td><strong>File button</strong></td>
<td>Click this button to open Back Stage view, which contains many options for working with your document (including printing) and setting Excel options.</td>
</tr>
<tr>
<td><strong>Formula bar</strong></td>
<td>When you enter information or formulas into a cell, it appears in this line.</td>
</tr>
<tr>
<td><strong>Help button</strong></td>
<td>Clicking this button displays the Excel Help system window.</td>
</tr>
<tr>
<td><strong>Horizontal scrollbar</strong></td>
<td>Use this tool to scroll the sheet horizontally.</td>
</tr>
<tr>
<td><strong>Insert function button</strong></td>
<td>Clicking this button insert function.</td>
</tr>
<tr>
<td><strong>Insert Sheet button</strong></td>
<td>By default, each new workbook that you create contains three sheets. Add a new sheet by clicking the Insert Worksheet button (which is displayed after the last sheet tab).</td>
</tr>
<tr>
<td><strong>Macro recorder indicator</strong></td>
<td>Click to start recording a VBA macro. The icon changes while your actions are being recorded. Click again to stop recording.</td>
</tr>
<tr>
<td><strong>Minimize Ribbon button</strong></td>
<td>Clicking this button hides the Ribbon, giving you a bit more space onscreen. When you click a tab, the Ribbon reappears.</td>
</tr>
<tr>
<td><strong>Name box</strong></td>
<td>This field displays the active cell address or the name of the selected cell, range, or object.</td>
</tr>
<tr>
<td><strong>Page View buttons</strong></td>
<td>Change the way the worksheet is displayed by clicking one of these buttons.</td>
</tr>
<tr>
<td><strong>Quick Access toolbar</strong></td>
<td>This customizable toolbar holds commonly used commands. The Quick Access toolbar is always visible, regardless of which tab is selected.</td>
</tr>
<tr>
<td><strong>Ribbon</strong></td>
<td>This is the main location for Excel commands. Clicking an item in the tab list changes the Ribbon that displays.</td>
</tr>
<tr>
<td><strong>Row numbers</strong></td>
<td>Numbers start from 1 — one for each row in the worksheet. You can click a row number to select an entire row of cells.</td>
</tr>
<tr>
<td><strong>Sheet tab scroll buttons</strong></td>
<td>Use these buttons to scroll the sheet tabs to display tabs that aren’t visible.</td>
</tr>
<tr>
<td><strong>Sheet tabs</strong></td>
<td>Each of these notebook-like tabs represents a different sheet in the workbook. A workbook can have any number of sheets, and each sheet has its name displayed in a sheet tab.</td>
</tr>
</tbody>
</table>
**Status bar**
This bar displays various messages as well as the status of the Num Lock, Caps Lock, and Scroll Lock keys on your keyboard. It also shows summary information about the range of cells that is selected. Right-click the status bar to change the information that’s displayed.

**Tab list**
Use these commands to display a different Ribbon, similar to a menu.

**Title bar**
This displays the name of the program and the name of the current workbook and holds some control buttons that you can use to modify the window.

**Vertical scrollbar**
Use this to scroll the sheet vertically.

**Window Close button**
Clicking this button closes the active workbook window.

**Window Maximize/Restore button**
Clicking this button increases the workbook window’s size to fill Excel’s complete workspace. If the window is already maximized, clicking this button “unmaximizes” Excel’s window so that it no longer fills the entire screen.

**Window Minimize button**
Clicking this button minimizes the workbook window, and it displays as an icon.

**Zoom control**
Use this scroller to zoom your worksheet in and out.

---

**FILE TAB**

File menu contain → save, save as, recent, new (to choose template for specific work), etc.

**New** (Create a new workbook by choosing specified template)

**Save** (save a workbook)

**Save as** (save a workbook with a new name or place)

**Open** (open any saved workbook)

**print** (print a desired sheet or sheets)

- make sure to set the number of copies.
- Make sure to select the correct printer.
- Choose what to print (active sheet, entire workbook, selection)
- Select the proper page size.
- Set the proper margins.
- Choose the scaling that work best for you.
HOME TAB

The home tab contains all the tools that you previously studied in addition to many other tools as follows.

**Book:** is an excel file, contain "sheets", and any sheet contain:

1. **ROW:** a group of cells are arranged horizontally and is indicated by number.
2. **COLUMN:** a group of cells are arranged vertically and is indicated by letter.
3. **CELL:** intersection between row and column, it is referred to by "cell reference" which is a letter of a column and the number of a row for example: the reference (E9) refers to column (E) and row (9).
4. **select all button:** To select all work sheet

**Cells Range:**

A. **Horizontal Range:** Which includes consecutive cells horizontally in a row.
B. **Vertical Range:** which include consecutive cells vertically in a column.
C. **Vertical and Horizontal Range:** Which includes consecutive cells horizontally and vertically at the same time.

**SELECTING A WHOLE ROW:** place the mouse pointer on the name of the specified row then left click it, to select other rows, select the first row and press **(CTRL)** key and select any other row or rows.

**SELECTING A WHOLE COLUMN:** put the mouse pointer on the name of the specified column then left click it and to select other columns, select the first column and press **(CTRL)** key and select any other column or columns.
**INSERTING A ROW:**
To insert a row in any place in a worksheet right click the row you want to insert a row before then select insert.

**INSERTING A COLUMN:**
To insert a column in any place in a worksheet right click the column you want to insert a column before then select insert.

**FREEZEING/UNFREEZEING FIRST COLUMN/ROW**
When the data is wider/longer than the width/height of the window, it is best to freeze first column/row while scrolling through rest of the worksheet by ("view" →window group →freeze panes→ freeze first column / freeze first row), the same steps can be done to unfreeze the first column/row

**Auto Fill:**
The auto fill is used to copy data, numeric numbers, date, to many sequential cells by using the fill handle of any cell to copy its contents to its neighboring cells by pointing to the bottom right side of the cell then when the shape of pointer switch to "+" continue clicking and dragging.

When we want to fill the cells by series data (ex:- days, months) then we enter the first data in the first cell for example (Sunday) then select and drag it to its neighboring cells to do a series fill.

**INSERTING / DELETING / RENAMING A SHEET**
To insert, delete or rename a sheet right click the sheet bar or the desired sheet and select the desired action.

**Merging Excel Cells**
To merge and center two or more excel cells select the cells then use the merge and center button, note that when you unmerge cells then the merged data are lost.

To merge cells across (merge the selected cells in the same row to one cell) click the drop-down arrow and select merge across.

To unmerge cells, click the drop-down arrow and select unmerge.
Changing Cell Orientation
To change the cell orientation in excel use the orientation button.
i.e. (rotate the text diagonally or vertically).

Text Wrapping
Break the long text (text that is beyond the cell boarders) into multiple lines to provide readability inside the cell, to add a new line inside the cell use ALT + ENTER.

Data Types
Microsoft Excel recognizes four kinds of information: Logical values (TRUE or FALSE, also called Boolean values), Numerical values, Text values, and Error types. The four kinds of information are known, in technical parlance, as Data Types.

Note that Excel will do the very best it can to figure out which of these types it THINKS you intend once you complete typing into a cell and hit the enter key. For example, if you type a series of numerals, it assumes you intend a number type. If that series of numerals happens to begin with one or more zeros, Excel STILL thinks you intend to type a number, and eliminates those leading zeros. Likewise, if you type something that looks like a date, and contains valid numbers which can represent a valid date, Excel assumes you mean a number type again, formatted as a date.

1-The Logical Data Type
Logical values are either TRUE or FALSE.

In most cases, logical values will be present as the result of the evaluation of an expression or function, for example the statement “1 is less than 2” is recognizable as a true statement. Another way to put that is:

= 1 < 2 which will result TRUE

When evaluating logical expressions, Excel recognizes the text TRUE as a logical value. Excel also treats the value 0 as false, and any other numerical value as true.
Changing Cell Orientation

To change the cell orientation in excel use the orientation button.

i.e. (rotate the text diagonally or vertically).

Text Wrapping

Break the long text (text that is beyond the cell boarders) into multiple lines to provide readability inside the cell, to add a new line inside the cell use ALT + ENTER.

Data Types

Microsoft Excel recognizes four kinds of information: Logical values (TRUE or FALSE, also called Boolean values), Numerical values, Text values, and Error types. The four kinds of information are known, in technical parlance, as Data Types.

Note that Excel will do the very best it can to figure out which of these types it THINKS you intend once you complete typing into a cell and hit the enter key. For example, if you type a series of numerals, it assumes you intend a number type. If that series of numerals happens to begin with one or more zeros, Excel STILL thinks you intend to type a number, and eliminates those leading zeros. Likewise, if you type something that looks like a date, and contains valid numbers which can represent a valid date, Excel assumes you mean a number type again, formatted as a date.

1-The Logical Data Type

Logical values are either TRUE or FALSE.

In most cases, logical values will be present as the result of the evaluation of an expression or function, for example the statement “1 is less than 2” is recognizable as a true statement. Another way to put that is:

= 1 < 2 which will result TRUE

When evaluating logical expressions, Excel recognizes the text TRUE as a logical value. Excel also treats the value 0 as false, and any other numerical value as true.
2-The Number Data Type

Numerical values are, of course, numbers with some type of formatting. There is many different Numerical value formatting as in the figure below.

1- General: the default format.
2- Number: best for data with numbers.
3- Currency/Accounting: best for monetary values.
4- Short/long date and time: best for date/time values.
5- Percentages: if the formula “=50/100” is entered excel will display it as 0.5 but when the cell is set to percentage format it will be shown as 50.00%.
6- Fraction: if the formula “=3/2” is entered excel will display it as 1.5 but when the cell is set to fraction format it will be shown as 1 ½.
7- Scientific: if the formula “=5 * 3 ^ 2” is entered excel will display it as 45 but when the cell is set to scientific format it will be shown as 4.50E+01, also you can enter the scientific notation directly by typing the number then e then the exponent in a general formatted cell like 5e-2.

HW: what is the usefulness of scientific formatting? do you think it will benefit you in the future?

3-The Text Data Type (the text option in the figure above)

In text cell format any data entered will appear as entered, useful when leading zeros are needed.

We can tell Excel to treat the data in a cell as text by pre-pending a single-quote character before the text we wish to enter, or by applying the text format to the cell through the cell formatting menu.

4-The Error Data Type

There are instances in which errors will occur when Excel evaluates the contents of a cell. For example, division by zero is mathematically undefined, it turns out the Excel has an Error type specifically for this instance, the #DIV/0! Result, another error is #VALUE! Which is resulted when an Invalid argument or operator in a function or formula are found.
**Conditional Formatting:** easily spot trends and patterns in the data using bars, colors, and icons.

The image on the right is an example of **ICON SET AND COLOR SCALES** applied to some values.

**Format as Table:** Once you’ve entered information into a worksheet, you may want to format your data as a table. Just like regular formatting, tables can improve the look and feel of your workbook, but they'll also help to organize your content and make your data easier to use. Excel includes several tools and predefined table styles, allowing you to create tables quickly and easily.

**To format data as a table:**

1. Select the cells you want to format as a table. For example, select the cell range A4:D10.
2. From the Home tab, click the Format as Table command in the Styles group.
3. Select a table style from the drop-down menu.
4. A dialog box will appear, confirming the selected cell range for the table.
5. If your table has headers, check the box next to My table has headers, then click OK.
6. The cell range will be formatted in the selected table style.

You can reformat the table and add new rows/columns to it by typing new content after the last row or column in the table. The row or column will be included in the table automatically.

**To remove a table:**

1. Select any cell in your table. The Table Design tab will appear.
2. Click the Convert to Range command in the Tools group.
3. A dialog box will appear. Click Yes.
4. The range will no longer be a table, but the cells will retain their data and formatting.

**Styles:** to apply several formats in one step, and to make sure that cells have consistent formatting, you can use a cell style. A cell style is a defined set of formatting characteristics, such as fonts and font sizes, number formats, cell borders, and cell shading.
Al-Noor University College
Computer for Medical Techniques Departments

2022 – 2023
M.S.O. EXCEL

BY: MUHAMMAD
ABDELKARIM
MUHAMMAD
Cells Group / Format:

- Format is used to do some changes to the cells size/visibility in addition to organizing and protecting the sheets and it can be reached by following (Home Tab -> Cells group-> Format).
Cells Group / Format Cont...

**Row Height**: set the row height in the sheet.

**AutoFit Row Height**: adjust the rows to fit the text in the cell (so that the text is completely within the cell).

**Column Width**: set the Column Width in the sheet.

**AutoFit column width**: adjust the columns to fit the text in the cell (so that the text is completely within the cell).

**Default Width**: Set the default width for all columns in the sheet.
Hide & Unhide: this option is useful when a certain row(s) or column(s) or sheets are required to be hidden / unhidden.

Lock Cell: Mark the selected cell as locked or unlocked (useful when using sheet protection feature).

Protect Sheet: Prevent other people from changing the sheet contents by limiting their ability to edit the sheet by using a password.

Move or copy a sheet: This option is useful when you want to duplicate a sheet or move/copy an active sheet from the current workbook to a new workbook.
INSERT TAB:

- **Inserting a picture:** adding a picture to the current sheet.

- **Inserting a shape:** adding a shape to the current sheet such as circle, square or line etc.

- **Inserting a textbox:** adding a text box anywhere in the current sheet.

- **Inserting word art:** write in artistic way in your file.

- **Insert equation:** adding mathematical equations to the current sheet.

- **Inserting symbol:** adding symbols that are not on the keyboard to the sheet.
PAGELAYOUT TAB:

- **Page orientation**: change the page orientation to landscape or portrait.

- **Page size**: change the page size to A4, A5 or letter etc.

- **Sheet direction**: switch the sheet direction left or right.

- **Background**: set a background for the sheet this adds some personality to the worksheet.
Data Sorting & Filtering:

There are many built-in Excel tools to help with data management and the sorting and filtering features are among the best.

**The filter tool** gives you the ability to filter a column of data within a table to isolate the key components you need.

**The sorting tool** allows you to sort by date, number, alphabetic order and more.
Data Sorting & Filtering cont...

Sorting data in Excel can be achieved in multiple ways, one is to use the “Home Tab >>> Editing Group >>> Sort & Filter”, another is to go to “Data Tab >>> Sort & Filter Group” then choose the type of sorting or filtering to be applied.

Finally, a multi-level sorting in Excel is possible using custom sort which satisfies the need to sort two columns or more at the same time.
Thank You
There are many built-in Excel tools to help with data management and the sorting and filtering features are among the best. The filter tool gives you the ability to filter a column of data within a table to isolate the key components you need. The sorting tool allows you to sort by date, number, alphabetic order and more. In the following example, we will explore the usage of sorting and filtering and show some advanced sorting techniques.

**SORTING:**

By examining the example illustrated in the figures 1 & 2, its easily noticeable that the items in figure 2 are sorted from the first one to the last based on the data in the “Group” column.

It’s also possible to sort the sheet data based on any column that contain data relevant or irrelevant data to the specified column data that we want to sort.

Sorting data in excel can be achieved in multiple ways, one is to use the **“Home Tab >>> Editing Group >>> Sort & Filter”**, another is to go to **“Data Tab >>> Sort & Filter Group”** then choose the type of sorting or filtering to be applied.

Finally, a multi-level sorting in Excel is possible using **custom sort** which satisfies the need to sort two columns or more at the same time.
**FILTERING:** In addition to sorting, you may find that adding a filter allows you to better analyze your data. When data is filtered, only rows that meet the filter criteria will display and other rows will be hidden. With filtered data, you can then copy, format, print, etc., your data, without having to sort or move it first. To use a filter,

1. Go to the Home Tab, click the arrow below the Sort & Filtering icon in the Editing group and choose Filter (*figure 3 above*).

OR

2. Go to the Data Tab, and then click Filter in the Sort & Filter group (*figure 4 above*).

You will notice that all your column headings now have an arrow next to the heading name. Click on the arrow next to the heading with which you want to filter, and you will see a list of all the unique values in that column. Check the box next to the criteria you wish to match and click OK. Click on the arrow next to another heading to further filter the data.

**Homework:** using what you learned today, use sorting and filtering to sort the data in figure 1 above based on item name then filter it so that only the even rows of the data are visible.
In Excel, a formula is an expression that operates on values in a range of cells or a cell. For example, =A1+A2+A3, which finds the sum of the range of values from cell A1 to cell A3.

Functions are predefined formulas in Excel. They eliminate laborious manual entry of formulas while giving them human-friendly names. For example: =SUM(A1:A3). The function sums all the values from A1 to A3.

**OPERATIONS PRECEDENCE**

It's important to understand that when you create a formula with several operators, Excel evaluates and performs the calculation in a specific order. For instance, Excel always performs multiplication before addition. This order is called the order of operator precedence. You can force Excel to override the built-in operator precedence by using parentheses to specify which operation to evaluate first.

Consider this basic example. The correct answer to (2+3)*4 is 20. However, if you leave off the parentheses, as in 2+3*4, Excel performs the calculation like this: 3*4 = 12 + 2 = 14. Excel's default order of operator precedence mandates that Excel perform multiplication before addition. Entering 2+3*4 gives you the wrong answer.

Because Excel evaluates and performs all calculations in parentheses first, placing 2+3 inside parentheses ensures the correct answer.

The order of operations for Excel is as follows:

1. Evaluate items in parentheses.
2. Evaluate ranges (:).
3. Evaluate unions (,).
4. Perform negation (-).
5. Perform exponentiation (^).
6. Perform multiplication (*) and division (/), which are of equal precedence.
7. Perform addition (+) and subtraction (-), which are of equal precedence.
8. Evaluate text operators (&).
Note: Operations that are equal in precedence are performed left to right.

Here is another widely demonstrated example. If you enter $10^2$, which represents the exponent 10 to the 2nd power as a formula, Excel returns 100 as the answer. If you enter $-10^2$, you expect $-100$ to be the result. Instead, Excel returns 100 yet again.

The reason is that Excel performs negation before exponentiation, meaning that Excel is converting 10 to $-10$ before the exponentiation, effectively calculating $-10^{-10}$, which indeed equals 100. Using parentheses in the formula $-(10^2)$ ensures that Excel calculates the exponent before negating the answer, giving you $-100$.

Note: Remembering the order of operations and using parentheses where appropriate will ensure that you avoid miscalculating your data.

Example: what is the result of the following formula, $= 6+3+$SUM(A1:A5,B1:B5)$-5*\frac{1}{2}$?

EXCEL FUNCTIONS

A function is a predefined formula that performs calculations using specific values in a particular order. Excel includes many common functions that can be used to quickly find the sum, average, count, maximum value, and minimum value for a range of cells. To use functions correctly, you'll need to understand the different parts of a function and how to create arguments to calculate values and cell references.

To work correctly, a function must be written a specific way, which is called the syntax. The basic syntax for a function is the equals sign (=), the function name (SUM, for example), and one or more arguments. Arguments contain the information you want to calculate. The function in the example below would add the values of the cell range A1:A20.
The followings are some excel functions that we will be dealing with through the course.

1- **SUM(range of cells)**
   - This function is used to find the summation for several cells in range that contain numbers.
   - There are two ways to use it, first you select the cells to be added together then select the cell that will contain the result then from the HOME tab → Editing group → AutoSum command.

   The second way is to write it manually using the keyboard as follows:
   - select the cell that will contain the result then type “ = SUM(Range Of Cells) “ and press enter.

2- **COUNT(range of cells)**
   - This function is used to find the number of cells in range that contain numbers.

3- **Average(range of cells)**
   - This function is used to find the average of cells in range that contain numbers.

4- **MAX / MIN(range of cells)**
   - These two functions are used to find the maximum/minimum value in the cells in range that contain numbers.

**EX: this is an example about the above functions.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>sum</th>
<th>average</th>
<th>count</th>
<th>max</th>
<th>min</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>muhammad</td>
<td>90</td>
<td>50</td>
<td>80</td>
<td>220</td>
<td>73.33333333</td>
<td>3</td>
<td>90</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ahmed</td>
<td>90</td>
<td>95</td>
<td>88</td>
<td>273</td>
<td>91</td>
<td>3</td>
<td>95</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>khalid</td>
<td>100</td>
<td>70</td>
<td>77</td>
<td>247</td>
<td>82.33333333</td>
<td>3</td>
<td>100</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>