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### Introduction to Data Analysis Using Excel and Lab Report Writing Using LaGCC Institution Data

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# INTRODUCTION TO EXCEL

## An Introduction to Data Analysis Using Excel

### Objectives:

1. To interpret, summarize and present numerical data using the digital tool Microsoft program Excel.
2. To plot numerical data as a graph and determine an equation of a line. In addition, using the appropriate formatting functions to label your graph and creating a best fit line.

### a) Introduction

After the introduction of the IBM-compatible personal computer in the early 80s, spreadsheet programs were introduced to enable businesses to easily convert their bookkeeping functions to the new PCs. It soon became apparent that these programs are powerful, flexible tools that can perform all kinds of mathematical tasks. Since they include easy-to-use graphical tools, they simplify the link between numerical and graphical techniques.

The goal of this assignment is to familiarize yourself with Excel as not only is it an indispensable method to communicate in STEM but the program can also be adopted for everyday life organizational tasks such as time management and tax filing. Here we will give you at least one way to do each task, but you may have a faster or more powerful method you prefer. Make sure you know how to do it as described here (so we all have a common reference), but then feel free to use any method you like.

When Excel has been initiated, you will see on the screen the typical layout for a spreadsheet program, with menu bars across the top of the screen and a grid pattern in the center, which is the spreadsheet itself. Several spreadsheets, and maybe some charts, are saved into a single file called a workbook. Your instructor will give you a set of data. You are to enter the data into an Excel workbook, show the equation of the line on the graph, title your graph and label your y and x axes.

### b) Controlling the Display of Numbers

You have been given a set of data: ten pairs of numbers. The first number in each pair is a value of the independent variable, the second is the associated value of the dependent variable. Your first job is to get these data into your spreadsheet. Type each value of the independent variable in a single cell. Put consecutive values into adjacent cells; the usual practice is to do this in a column. In the adjacent column, type the associated values of the dependent variable. These two lists of numbers may be anywhere in the spreadsheet; you will subsequently refer to them by their addresses. You may want to put labels in the cells at the top of the columns to indicate their contents. (eg. Y values and X values). Please save your work as you move along the assignment

### c) Graphing in Excel

Now you can graph the ordered pairs.

Select the two columns of data to be graphed, without the column headings. Open the **Insert** ribbon, and choose **Charts/Scatter**. Select the chart type that gives you only the data points. The chart shows immediately with the default settings.

Now you need to edit your data series on the chart. To edit an object (axis, data series, title, etc.), left-click on the object to select it. Once the object has been selected, right-click to get a pop-up menu. For example, to select the data series, put the cursor on a data point, left-click to select it, then right-click to get the editing menu. (Or just right-click on the data.) Select **Format Data Series...** This menu has several boxes; look through them to see how you can change the format of the data series. Put in a line connecting the data points, change the marker color to red, change the marker shape to a solid circle, and change its size to 6 points. When you are done, click **Close** and your changes will appear on the graph.

The line connecting the data wanders all over the page! The reason is that Excel automatically plots data in the order of the cells on the spreadsheet, and since your data is not in the numerical order of the horizontal axis, connecting the dots brings the line all over the page. For this exercise, you will only display markers for experimental data—and not connect the dots! Go back to the “Patterns” box and remove the line.

Now you need axis labels. Click on the chart, and then open the **Layout** ribbon under **Chart Tools** at the top of the screen. Choose **Labels/Axis Titles** and choose a title format for each axis. A box appears on the chart for each axis label. Click on the box, and enter the text. If you need to change the font or style of the type, left-click once to select, then right-click to pop up the menu.

You are done with the chart for now. Save your workbook.

#### d) **Equation of a line in Excel**

There are a couple of ways to insert a straight line and to show the equation ( $y = mx + b$ ). One way is to select the data on your graph and add trendline. This also allows you to put the equation of the line on your graph

#### e) **Sorting Numbers**

When you entered the data given you, you saw that the line connecting the data wandered all over the page. The reason is that Excel automatically plots data in the order it is given, and since your data is not in the numerical order of the horizontal axis, connecting the dots brings the line all over the page. This can be corrected by sorting the data into numerical order according to the independent variable (x variable). Lets practice

Select the block of data that you want to sort. Go to **Editing/Sort & Filter** on the **Home** ribbon, and choose **Sort Smallest to Largest**. The data will appear in the same block, but now sorted according to the numerical order of the independent variable.

**You will upload the Excel graph (indicate the data set in the title of your graph) your ePortfolio and email me your graph**

**The assignment is due October 10<sup>th</sup> (9:15am). Late penalties will apply for this assignment.**

**Grading:**

All data is plotted on Excel graph	25
Curve uses the entire graph	25
Equation of line is shown on graph	25
Title and axes are properly labeled	<u>25</u>
	100

Fall 2017

**LMF 101 -Lab Report Writing Using LaGCC Institutional Data****Objectives:**

1. To communicate your interpretations of research data. This is done writing discussions and conclusions (using scientific language) and is often accompanied by data tables and graphs.
2. To use your Microsoft Excel graphing skills to interpret, inquire and extrapolate meaning data to support your lab report conclusions
3. To structure your written lab report in the format of: Abstract, Introduction, Material, Methods, Results, Discussion/Conclusion and References

This assignment will contribute to your Inquiry and Problem Solving skills and writing communication proficiency.

**Brief Review from Class about Lab Report Writing-**

Introduction- Include relevant background information, the hypothesis should be your last statement

Material and methods- The procedure should give enough details to allow the audience to repeat your experiment. Write out step by step. Keep the audience background in mind.

Results- To present information, use Tables, Figures and/or Graphs. Each graphic should include a figure caption. If there are many calculations involved, write out an example and create an appendix

Discussion/Conclusion – Shows an understanding of the data and demonstrates the significance of the experiment. Explains why it did and did not work. Compares results with literature data and attempts to relate conclusions with hypothesis. Outlines possible sources of error in the experiment.

**Task:** Using the format discussed in class: Abstract, Introduction, Material, Methods, Results, Discussion/Conclusion and References you will write a 2-3 pages report (which will include at least one graph or table) about LaGuardia Community College (LaGCC).

Topics that you can address are LaGCC's:

- History
- Student Population
- Funding/Costs
- Technology
- Programs

There are multiple sources to get data on LaGCC:

Laguardia Community College Website

1. <http://www.lagcc.cuny.edu/IR/IR-facts/>
2. Google scholar: LaGuardia Community College
3. Institutional Profile 2015
4. <http://www.lagcc.cuny.edu/home/LaGuardia-All-News/>
5. <http://www.laguardia.cuny.edu/About/Publications/>

**Grading:**

Report Format	30
Topic from the LaGCC data you are investigating	20
Conclusions from data	30
Scientific language	<u>20</u>
	100