

Homework Assignment #8 (Excel C)

Reference:

Read Chapter 14 in Engineering Fundamentals – An Introduction to Engineering, 3rd Edition by Moaveni.

Example: *Using Lookup Tables in Microsoft Excel*

Example: *Using Histograms in Microsoft Excel*

Assignment:

For each problem below:

- Include your name, course number, course title, assignment number, & problem number
- Include brief instructions
- Include any given data in tables. The tables should include lines, complete table headings, and centered data with the provided number of digits. Graphs should include appropriate formatting.
- Follow any other instructions given with each problem.

Additional instructions:

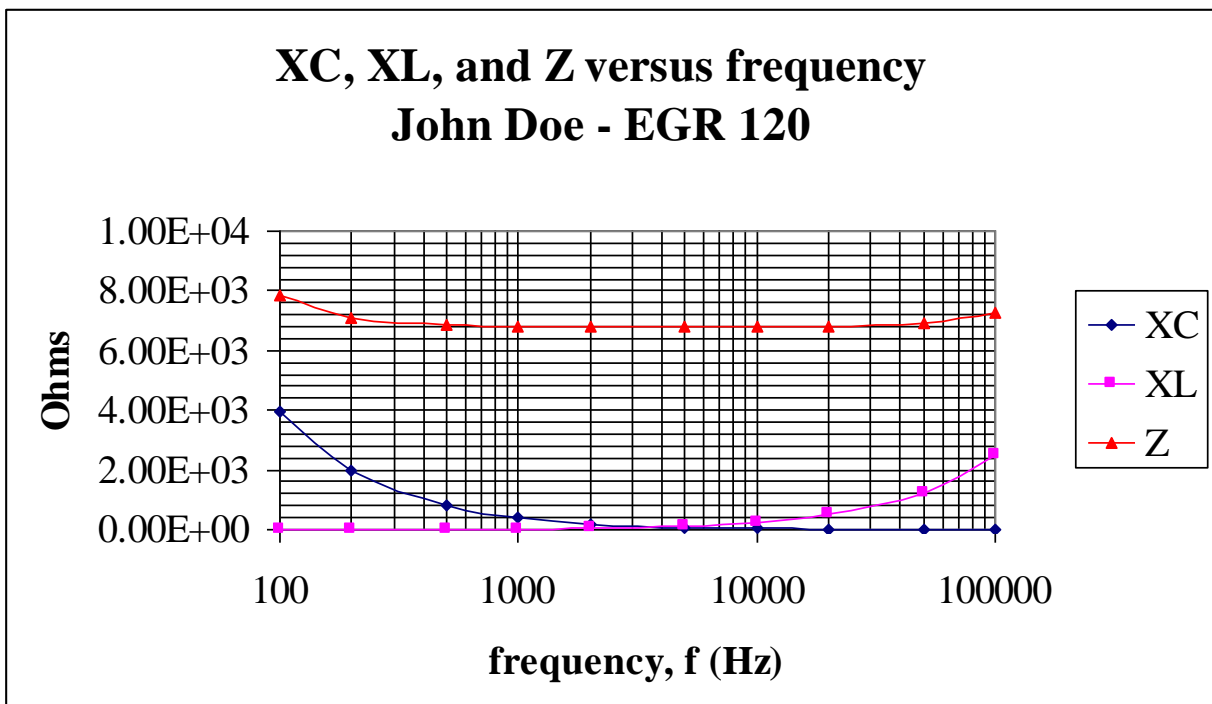
- Use only one Excel file for the assignment. Place each problem on a separate worksheet (tab) in the Excel file and rename the tab with the problem number..
- Print the assignment and submit it to the instructor during class and also email the file to the instructor.

1. Graphing curves with multiple sets of y values

Repeat the table of Problem 3 in Homework #6 (the table of values for f , X_C , X_L , Z , and $p.f.$).

Form a single graph showing X_C vs f , X_L vs f , and Z vs f . Include a legend as shown below.

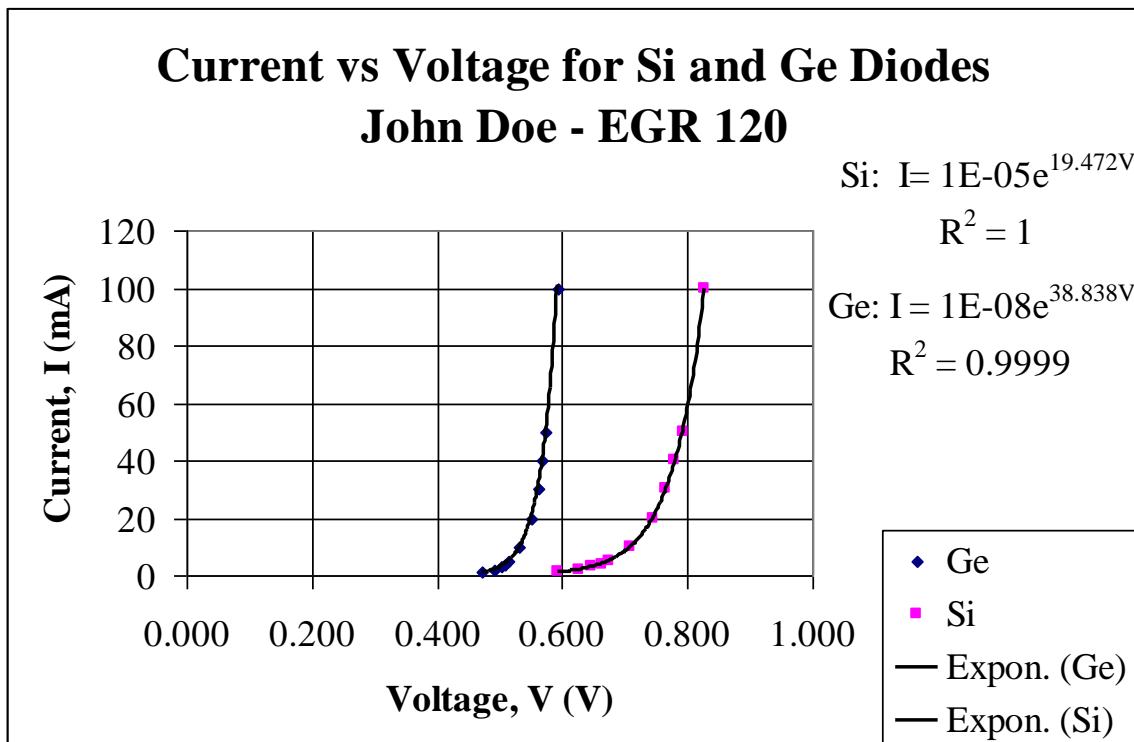
Use a scatter plot with a smooth curve (no trendline is needed). The final graph should look like the graph shown below (with your name instead of John Doe). Use a log scale on the x-axis.



2. Graphing curves with multiple sets of x values

Shown below are voltage and current values for two types of electrical devices called diodes. One of the diodes is made of germanium and the other is made of silicon. It is common to graph these curves with common current values and with current on the y-axis. Form a spreadsheet with the table below and with a graph like the one shown below (use linear scales for both axes).

Current (mA)	Germanium Diode Voltage (V)	Silicon Diode Voltage (V)
1	0.473	0.592
2	0.491	0.627
3	0.502	0.648
4	0.509	0.663
5	0.515	0.674
10	0.532	0.710
20	0.550	0.746
30	0.561	0.766
40	0.568	0.781
50	0.574	0.793
100	0.592	0.828



3. **Wind Energy Table and Column Chart**

- Go to the Department of Energy web site at www.doe.gov
- Select **Trends and Prices** and then select **Annual Energy Review** (or else search for Annual Energy Review).
- Under Tables and Graphs, select **8. Electricity**
- Select **Table 8.2b – Electricity Net Generation** (pdf file under Tables)

A) Take data from the Annual Energy Review and use it to **create a table in Excel** like the one below. Fill out the two columns on the left with data from the table beginning in 1998 through the most recent year reported. Use a formula in Excel to calculate the % of wind power.

Year	Wind Energy for Electricity Generation (Billion kW·h)	Total Energy for Electricity Generation (Billion kW·h)	% of Electricity Energy Generated by Wind
1998	3.0	3457.4	0.087
1999	4.5	3530.0	0.130
2000	5.6	3637.5	0.162
most recent			

B) Form a **column chart** from the Excel table created (as described above) and create a graph of **% of Electricity Energy Generated by Wind**.

4. **Pie Chart**

Create a **pie chart** with the following data.

- Include a legend.
- Include percentages, discipline titles, and the number of degrees next to each pie slice. Each percentage should include 1 digit after the decimal point.
- Include the title: **1999 Bachelor's Degrees Awarded by Discipline**

1999 Bachelor's Degrees Awarded by Discipline

(Total: 59,134)

Source: American Society of Engineering Education

Discipline	B.S. Degrees Awarded
Electrical & Computer	17,492
Mechanical	12,320
Civil	9,551
Chemical	3,522
Industrial	5,596
Aerospace	1,236
Biomedical	798
Metallurgical & Materials	707
Agricultural	456
Eng. Science & Eng. Physics	301
Petroleum	183
Mining	145
Nuclear	107
Other	6,777

5. **Statistics**

The AC voltage measured at a household wall outlet can vary as the amount of power used customers of the power plant varies. The voltage at a particular outlet was monitored and its value recorded many times over a one-week period. The results are shown below. Tabulate the results and then use functions in Excel to determine the average, median, maximum, minimum, mode, standard deviation, and the number of measurements. Box and label each result. Also copy the table and use the Excel sort feature to sort the values from lowest to highest (in other words, show the original data in the left column and the sorted data in the right column). Shade the median value. Is it in the middle of the table? Should it be? Show the Excel formula used in each case (as text) next to the results.

120 V
118 V
126 V
123 V
129 V
124 V
115 V
121 V
119 V
121 V
121 V
131 V
125 V
126 V
127 V

6. **Histogram**

An Electrical Engineering student bought a pack of twenty 10 kΩ resistors from a local electronics store. The resistors have a 10% tolerance, so all values should lie between 9 kΩ and 11 kΩ. The student measured each value using an ohmmeter and the results are shown below. Generate a histogram (and the bin/frequency) table based on the ranges specified below. Note: the form shown for the bounds below may not be in the correct format.

Resistance, R (kΩ)
10.15
9.97
10.51
9.65
9.74
10.13
9.44
10.66
9.50
10.29
9.87
10.51
10.24
9.81
9.76
10.40
10.11
9.95
10.72
9.39

Bounds for Histogram
9.0 – 9.2 kΩ
9.2 – 9.4 kΩ
9.4 – 9.6 kΩ
9.6 – 9.8 kΩ
9.8 – 10.0 kΩ
10.0 – 10.2 kΩ
10.2 – 10.4 kΩ
10.4 – 10.6 kΩ
10.6 – 10.8 kΩ
10.8 – 11.0 kΩ

7. **Matrix Operations** (Refer to the handout *Matrix Operations in Excel*)

Work problem 14.25 in the text.

Include sample Excel equations (as text) to show your calculations.

8. **Matrix Operations** (Refer to the handout *Matrix Operations in Excel*)

Work problem 14.26 in the text.

Include sample Excel equations (as text) to show your calculations.

9. **Look Up Tables and Look Up Functions**

Many college courses use statistics to assign test and course grades based on the mean and the standard deviation for the class. This is common in universities, but less common in community colleges, because this is not considered to be a good method unless class sizes are 30 or greater and most community colleges have small class sizes.

- Make up a table containing the last name, first name, age, and test scores for a class of 35 Engineering students. All test scores must be in the range 0 to 100, but let most of the test scores be in the 60's, 70's, 80's, and 90's with a reasonable distribution of scores. Do not repeat any names. If the names are not already in alphabetical order, sort them alphabetically using **Data – Sort**. Use typical ages for college students. Set up a fifth column in the table for the letter grade which Excel will assign statistically, as described below. (Your table should be unique and use different information from anyone else in your EGR 120 class.)
- Use statistical functions in Excel to find the mean, standard deviation, maximum, and minimum. Label and box each answer.
- Create a **lookup table** which will list the cutoff between each grade range as follows:
 - A/B cutoff: Mean + Standard Deviation
 - B/C cutoff: Mean + Standard Deviation/3
 - C/D cutoff: Mean - Standard Deviation/3
 - D/F cutoff: Mean - Standard Deviation
- Use a lookup function to assign the letter grade A, B, C, D, or F to each student based on the grade cutoffs specified in the lookup table.
- An example (incomplete) Excel spreadsheet is shown below:
- Include sample Excel equations (as text) to show your calculations.

Last name	First name	Age	Test Score	Grade
Anderson	Tim	23	82	C
Brown	Lisa	19	83	B
Butler	John	28	91	B
...				
...				
...				
White	Jeremy	20	72	

Note: use the lookup function to assign each letter grade

Mean:	77.8
Std Dev:	14.1
Max:	99
Min:	54

Note: Use Excel's AVERAGE(..) function

Lookup Table

Grade	Value
F	0
D	
C	
B	82.5
A	91.9

Note: Use formula for the mean - Std Dev

Note: Use formula for the mean - Std Dev/3

Note: Use formula for the mean + Std Dev/3

Note: Use formula for the mean + Std Dev

Extra Credit (up to 10 points):

- A) Create a table of wind chill temperatures similar to Table 11.6 in the textbook.
- B) Graph wind chill temperature versus ambient temperature for each wind speed. The graph should look like the one shown below.

