QUEENSBOROUGH COMMUNITY COLLEGE

Department of Engineering Technology

ET 821

Lab 7 Spreadsheets—Trigonometric Functions

In this exercise, we will use a spreadsheet to develop, calculate and chart trigonometric functions. We will also calculate the average value and the effective value of a sinewave. The effective value is also know as the RMS value. This is the value we often refer to when specifying an AC voltage. The average value of a sinewave over 360 degrees is equal to zero. For this reason we often calculate it over 180 degrees. It is equal to 0.636 times the peak value. The RMS value of a sinewave is equal to 0.707 times the peak value. It can be calculated as the square root of the average of the squared values.

1. Start Excel by clicking on the **Start** button, pointing to **All** **Programs**, **Microsoft Office**, and then clicking on **Microsoft Excel.** Excel will display an empty worksheet.
2. Referring to the sample spreadsheet at the end of this exercise, select cell A1 and type the text **Trigonometric Functions**. Click on the **green** **check mark** (enter) button to enter the text.
3. Type the headings **Degrees, Radians, Sine, Sine Squared, Cosine** in cells A2, B2, C2, D2 and E2 respectively. Use the cursor control arrow keys to change cells.
4. Increase the width of column D by dragging the D column separater line to the right so that the entire heading can be seen.
5. Center the chart heading Trigonometric Functions by selecting cell A1. Drag the *block plus sign* to cell E1. The range of cells A1:E1 should be highlighted.
6. Right Click in the selected cells and select **Format cells**. Click on the **Alignment tab**. Change Horizontal from General to **Center Across Selection**.
7. Increase the point size of the heading text by selecting cell A1 and clicking on the **font size arrow.** The default is 10 points. Change the point size of cell A1 to 14 points.
8. Select cell A1 and click on the **Bold button**. It is located to the left of the italics button on the tool bar.
9. Referring to the sample spreadsheet at the end of this exercise, enter the **only** the data for the *Degrees* cells **A3, A4,** and **A5** (**0, 10, 20**), using the **cursor control arrow keys** to change cells.
10. Select the three cells (**A3, A4, A5**) and drag the Fill Handle located in the lower right hand corner of Cell A5 to fill the remaining cells up to 360 degrees in 10 degree increments. Note that when the fill handle is selected, the mouse pointer changes from a *block plus sign* to a *small dark plus sign* (+). The last cell (A39) should contain 360.
11. Select Cell **B3** and enter the following formula to calculate radians from degrees (**=PI()\*A3/180**). Click on the green check mark to enter the formula.
12. Drag the Fill Handle to complete the calculations for Cells **B4** through **B39**. The calculations are repeated using the data for each row separately. Note that we will round-off the numbers in step 19.
13. Select Cell **C3** and enter the following formula to calculate Sine from the radians column (**=SIN(B3)**). Click on the green check mark to enter the formula.
14. Drag the Fill Handle to complete the calculations for Cells **C4** through **C39**. The calculations are repeated using the data for each row separately. Note that we will round-off the numbers in step 19.
15. Select Cell **D3** and enter the following formula to calculate Sine from the radians column (**=C3^2**). Click on the green check mark to enter the formula.
16. Drag the Fill Handle to complete the calculations for Cells **D4** through **D39**. The calculations are repeated using the data for each row separately. Note that we will round-off the numbers in step 19.
17. Select Cell **E3** and enter the following formula to calculate Sine from the radians column (**=COS(B3)**). Click on the green check mark to enter the formula.
18. Drag the Fill Handle to complete the calculations for Cells **E4** through **E39**. The calculations are repeated using the data for each row separately. Note that we will round-off the numbers in step 19.
19. Round off the calculation results to four decimal places. Select all of the calculations in the cell area **B3:E39**. Select **Format, Cells, Number Tab** from the pull-down menu and then increase the number **Decimal places** to 4. Click on the **OK button**.
20. Type the following headings in Cells **A41, A42, A44, A45** (Average of Squares, Sqrt of Average, Average over 180 Degrees, Average over 360 Degrees.
21. Select Cell **D41** and enter the following formula (**=AVERAGE(D3:D38)**).
22. Select Cell **D42** and enter the following formula (**=SQRT(D41)**).
23. Select Cell **D44** and enter the following formula (**=AVERAGE(C3:C20)**).
24. Select Cell **D45** and enter the following formula (**=AVERAGE(C3:C38)**).
25. Round off the calculation results to four decimal places. Select all of the calculations in the cell area **D41:D45**. Select **Format, Cells, Number Tab** from the pull-down menu and then increase the number **Decimal places** **to 4**. Click on the **OK button**.
26. Save your work as LAB6.XLS.
27. Select a cell outside of the data cells. Create a graph of the sine and cosine functions by selecting cells **A2 to A39**. Hold down the **control key** and select cells **C2 to C39**. Hold down the **control key** and select cells **E2 to E39**. The three columns Degrees, Sine and Cosine should all be highlighted.
28. With the data selected click on the **Insert Tab** click on **Scatter** in the **Chart** group ans select **Scatter with Smooth Lines**. Click on the **Layout Tab** and then select **Chart Title**. Enter the title **Trigonometric Functions**. Enter the title **Degrees** for the Horizontal **Axis Title**.
29. Position the Chart chart sized to cover cells **F9 to J24**.
30. Click on the **File Tab**, select **Print** and change the margins to **Narrow Margins**.
31. Save your work as LAB6.XLS.
32. Print your work.

