

Use the direct solution format for all questions on this assignment.

1. Given the following raw data from a pump measurement

head, $h$	75 cm
mass, $\Delta m$	350 g
time, $\Delta t$	24 s
Voltage, $V^p$	11.98 V
Current, $I_p$	0.42 A

- a. Using the symbols in the table, write down the formulas (using symbols, not numbers) for computing the volumetric flow rate in L/min and the efficiency of the pump. Provide any additional data necessary to complete the calculations.
  - b. Substitute the numerical values in the table to obtain values for the flow rate and the efficiency.
2. Download the `sample_pump_data.xlsx` from the class web site.
    - a. Expand the rows at the top of the spreadsheet to include
      - Your name
      - The class (ME 120)
      - A concise, one-line description of the contents of the spreadsheet
      - Extra rows with numerical values, including labels and units of any constants needed in the calculations
    - b. Create columns in the spreadsheet for the flow rate in L/min and efficiency of the pump
    - c. Write out the spreadsheet formulas necessary to compute the volumetric flow rate and efficiency of the pump for the first row of data. The formulas should use spreadsheet cell notation. Include those formulas in the document you turn in for the assignment.
    - d. Use the formulas for flow rate and efficiency to complete the data in the table. Make a plot of head versus flow rate and a plot of efficiency versus flow rate on the spreadsheet. Add labels for the axes. Add curve fits to each plot.
    - e. Arrange the plots and tables so that the spreadsheet prints on a single sheet of paper. Attach the printed spreadsheet page to your assignment.