Intermediate Laboratory: Homework 1

Due: 26 January 2024

Read chapters 1 and 2 and complete the following problems. The numbers refer to the second edition of the text; numbers of the third edition are listed in italics.

1 Taylor, *Error Analysis, 2nd ed.*, 2.2, page 35.*(2.2 in 3rd ed.)*

2 Taylor, *Error Analysis, 2nd ed.*, 2.4, page 36.*(2.4 in 3rd ed.)*

3 Taylor, *Error Analysis, 2nd ed.*, 2.6, page 36.*(2.6 in 3rd ed.)*

4 Taylor, *Error Analysis, 2nd ed.*, 2.12, page 38.*(2.14 in 3rd ed.)*

5 Taylor, *Error Analysis, 2nd ed.*, 2.15, page 39.*(2.17 in 3rd ed.)*

6 Digital Ammeters

A cheap digital ammeter can read a current to the nearest 0.10A.

a) Would this ammeter be able to measure a 3.0A current to a precision of 2%? Explain your answer.

b) Would a more precise ammeter that can measure to 1 mA be able to do this? Explain your answer.

7 Fractional Uncertainties

a) The quantity g is measured in an experiment. Data analysis gives $9.7532\,\mathrm{m/s^2}$ with an uncertainty of 4%. Determine the uncertainty is g, the error in g and the correct number of significant figures to report for g. Write the result of the experiment in the standard form for expressing a measured quantity.

b) The universal gas constant is measured in an experiment and this gives $R = 8.32\,\mathrm{J/mol\ K}$ with a 0.5% error. Write the result of this experiment in the standard form for expressing a measured quantity.

8 Taylor, *Error Analysis, 2nd ed.*, 2.28, page 42.*(2.30 in 3rd ed.)*