

Physics 307L: Homework #1
Due October 24, 2012
10 points

Find the expression for the error in q as a function of the error in the independent variables. All variables in capital letters have a known standard error associated with them ($A \pm \sigma_A$), whereas lower case values are known exactly.

Show your expression is correct by using a Monte-Carlo simulation. Use 'randn' to generate a set of repeat data for each independent variable ($N=1000$) with a known standard deviation (σ_A), and use these values to calculate q and the standard deviation in q . Check that the values and errors you choose meet the requirements of the first-order Taylor series expansion.

Submit your results by e-mail as a MATLAB 'm-file' named 'LASTNAME_HW1.m' and the email subject '307L HW1'. Inside the 'm-file', the analytical expression should be obvious and clearly readable in commented text. Running your script should generate a clearly readable result for each case. You probably want to use 'fprintf' in some manner.

$$q = aA \tag{1}$$

$$q = aA + bB \tag{2}$$

$$q = AB \tag{3}$$

$$q = A/B \tag{4}$$

$$q = a \exp A \tag{5}$$

$$q = A^2 \tag{6}$$

$$q = AB + C \tag{7}$$

$$q = \frac{A + B}{C + D} \tag{8}$$

$$q = a \cos A \tag{9}$$

$$q = A^B \tag{10}$$