

# PH4390 Computational Methods in Physics

Assignment 01: Error Analysis

Fall 2017

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## Problem 1

In SI units the Bohr radius is given by the following:

$$a_o = \frac{4\pi\epsilon_o\hbar^2}{m_e e^2}$$

Use the following values:

Permittivity of Free Space:  $\epsilon_o = 8.85 * 10^{-12} Fm^{-1}$

Reduced Planck Constant:  $\hbar = 1.05 * 10^{-34} Js$

Electron Mass:  $m_e = 9.11 * 10^{-31} kg$

Elementary Charge:  $e = 1.60 * 10^{-19} C$

$\pi$ : 3.14 or M\_PI from (math.h)

## Coding

Using single and double precision calculate the Bohr radius. Calculate the numerator and denominator separately and calculate the Bohr radius all at once. A suggested output scheme is given below.

Bohr radius calculation in two parts:

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Single Precision top : #

Single Precision bottom : #

Single Precision : # m

Bohr radius calculation in two parts:

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Double Precision top : #

Double Precision bottom : #

Double Precision : # m

Bohr radius calculation in one part:

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Single Precision : # m

Bohr radius calculation in one part:

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Double Precision : # m

## Question(s)

1. Which of the four methods for calculating the Bohr radius worked best, explain. Which method did not work, explain.