Problem Set # 2

Engineering 104 - Fundamentals of Engineering Computing

Complete the following problems in `Excel` and include as part of the submission of the appropriate assignment. Your assignment file should include a proper heading, comments and have a clear organizational structure. Each problem in the combined assignment should have its own tab in a combined `Excel` workbook.

Excel, Lecture #2 Problems - Algorithms (12 Points)

Problem 2.1 (6 Points)

Create a new sheet in your *Assignment 2* `Excel` file named **Problem 2.1**. Consider the cannon model(kinematics) developed and discussed in class. Use the equations developed (and repeated here), a launch speed of 10 m/s, and a launch angle of 50° ($g = 9.81 m/s^2$),

$$h(t) = vtsin\theta - \frac{1}{2}gt^2 \tag{1}$$

$$x(t) = vtcos\theta \tag{2}$$

(a) Create, and plot x(t) vs. h(t), an algorithmic solution to the problem in `Excel` using Δt. Professionally label your plot. In as cell on the problem sheet explain how the algorithmic solution works and how it is different the the direct analytical solution.

(b) On your spreadsheet, determine the time for the projectile to reach a distance of 8 meters (x(t) = 8), as well as the height at this time by highlighting and labeling these cells in your algorithmic solution table.

$$t(x = 8) = ? \qquad\qquad h(x = 8) = ?$$

(c) As text in a cell explain if you did this experiment on the moon where $g = 1.62\ m/s^2$, which of these values would change?

(d) By hand complete three steps of the algorithmic procedure that is happening when you solve this problem in `Excel`. Take a picture of this handwritten work and import it as an image into your spreadsheet.

Problem 2.2 (6 Points)

Create a sheet named **Problem 2.2** in you *Assignment 2* Excel spreadsheet document.

1. Download the file "sample_grades.txt" from Canvas. This file contains a list of student IDs and homework grades. There are 7 rows for 7 students, plus a header row at the top. Each row contains a student ID and 5 homework grades. The "columns" are delimited by Tab characters.
2. Import this file into Excel so that the data are properly stored in rows and columns.
3. Add a column to compute the average homework grade for each student.
4. Add a column which uses IF statements to test the average and set the cell to the appropriate letter grade, i.e. A for 90-100, B for 80-89, C for 70-79, D for 60-69, F for lower than 60.