CE 329 Fall 2015
MATLAB Assignment 3

The purpose of this assignment is to ensure that you know how to solve a set of initial value ordinary differential equations numerically using MATLAB. You are strongly encouraged to do this by modifying the template file SolvIVDifI.m or SolvIVDifD.m, whichever is appropriate, from AFCoKaRE. The equations you will solve are the same as those that need to be solved for regular homework Assignment 18. Since the purpose here is only to test your ability to ***solve*** the equations, not your ability to set them up, the equations are being provided to you.

Your code should define variables and assign values as follows:

k(163ºC) = 0.8, E = 28960, ΔH = -20750, C_p = 125, C_A^0 = 3.6 x 10-3, C_B^0 = 0, T^0 = 436.15, f_A = 0.97, R = 1.987 and V = 100.

It should also calculate the following known constants:

k0 = k(163ºC)exp(E/RT^0), $n_A^0 = C_{A0}$*V, $n_B^0 = C_B^0$*V

Your code should then solve the following three equations using the final condition that $n_A = n_A^0(1-f_A)$:

$$\frac{dn_A}{dt} = -Vk_0 e^{\frac{-E}{RT}}\left(\frac{n_A}{V}\right);\quad n_A(0) = n_A^0$$

$$\frac{dn_B}{dt} = Vk_0 e^{\frac{-E}{RT}}\left(\frac{n_A}{V}\right);\quad n_B(0) = n_B^0$$

$$\frac{dT}{dt} = \frac{-V\Delta Hk_0 e^{\frac{-E}{RT}}\left(\frac{n_A}{V}\right)}{n_A\hat{C}_{p,A} + n_B\hat{C}_{p,B}};\qquad \mathrm{T}(0) = T^0$$

Finally your code should *report* the final time and temperature

You should submit a single MATLAB file with the filename being (your last name)_M3.m. To assign a grade, the TA will quickly examine your file and then execute it. To receive full credit, the last things it displays should be ***the correct values*** of the final time and temperature. In other words, if your code does not run or it does not display the correct answer upon running, you will not receive full credit.