Project 6 - Initial Value Problems - Part C

Due Wednesday 3-6

1. A 3F capacitor, initially charge to 5V is left to discharge through a 8 Ohm resistor. Determine the charge on the capacitor after 0.5 seconds. You've already done this twice, once using Euler's method with a step of 0.01 seconds and once in closed form. For this problem, you will calculate your answer two more times using two versions of a Runge-Kutta algorithm. Use step sizes of 0.01 seconds.

   (a) To estimate the next value for q, use the average of the initial slope and the final slope. To estimate the final slope, use the initial slope to estimate the final final for q. This is a Runge Kutta algorithm of second order. Let's call this the "RK2 - trapezoidal method".

   (b) To estimate the next value for q, use a weighted average of midpoint and trapezoidal slopes that is the classic Runge Kutta fourth order algorithm. See notes from class.

2. We desperately need to do more problems that involve vectors. Here's one. Consider a 5 kg 2x2 meter square plate with the bottom left corner at the origin. Computationally determine the magnitude of the gravitational force on a 1 kg mass placed at (-1,0)m.

Submit your cpp file to the P6 dropbox. Please label your cpp file Name6C.cpp.