Math 128a, Chorin, Spring 2013, computer homework 5

Use a fourth-order RK scheme (page 266) to solve the equation $y' = 5y$ with the initial condition $y(0) = 1$, for $0 \leq x \leq 5$. Use adaptive meshing to pick the step size h, in order to keep the error $< 10^{-5}$; to estimate the error, use either the Runge-Kutta-Fehlberg method as suggested in the text, or an extrapolation from a calculation where you redo each step using two steps with half the mesh size (you can assume the extrapolation is legitimate).

Reminder: Suppose the error is approximately Ch^n, where C is independent of h. If you know the error you made is ϵ_1, but you want it to be ϵ_2, you should decrease or increase the step size by a factor q so that

$$\frac{C(qh)^n}{Ch^n} = q^n = \frac{\epsilon_2}{\epsilon_1}.$$