Numerical Analysis Semester 081 Problem Set 14
Reference: For Problems 1 Class Notes.
For Problem 2 Sections 8.3and 8.4 Runge Kutta Methods

1. For the differential equation

$\frac{dy}{dt} = t^2 - y$, y(0)=1

Apply Taylor's Method of Order N = 4

a) With h = .2, do two steps.
b) With h = .1, do four steps.
c) Compare your computed approximate solutions for y(.4) with the true value for y(.4) (The true solution is $y(t) = -e^{-t} + t^2 - 2t + 2$.

2. For the same differential equation as in problem 1
Apply the Runge-Kutta Method of Order N=4

a) With h = .2, do two steps.
b) With h = .1, do four steps.
c) Compare your computed approximate solutions for y(.4) with the true value for y(.4) (The true solution is $y(t) = -e^{-t} + t^2 - 2t + 2$.

3. Since each of the above methods have final global error that is $O(h^4)$, what should we expect to happen to the error with both Taylor's Method and the Runge Kutta Method when the interval size is halved from? Did you observe this behavior in your computed approximations for y(.4)?