MTH 430: Numerical Analysis & Scientific Computing II
Department of Mathematics and Statistics
Indian Institute of Technology - Kanpur

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LAB 4a

Consider the initial value problem

$$y' = -100y + 100t + 101,$$
$$y(0) = y_0.$$

Given y_0, h, and N, where the input y_0 specifies the initial value, h is the size of the uniform time stepping and N is the number of time steps for which the approximate solutions are to be computed, use the the following Run ge-Kutta methods

1. *Heun's method*

2. *Modified Euler method*

3. *Heun's 3-stage method*

4. *Runge-Kutta-Simpson 4-stage method*

to solve this IVP to obtain approximations y_n^1, y_n^2, y_n^3 and y_n^4 respectively for y at uniform time steps $t_n = nh$, $n = 0, 1, \cdots, N$. The first line of your Matlab implementation should read

```
function [y,y1,y2,y3,y4] = lab5_ex(y0,h,N)
```