h=30
60
120
240
480

120

End Semester Lab Examination
19/11/2018, 2-4pm

Computational Physics(PH305)
Marks: 100

Instructions:

- Insert the pendrive containing your codes in your computer.
- Modify the necessary codes according to the questions below.
- Generate the solution after execution of your code and wait for the invigilator to evaluate.
- Note books and calculators are not allowed.
- Exchange of anything among each other is not allowed.

Problem:1 A hot ball at 1200K cools down at an ambient temperature of 300K. The differential equation for the temperature due to heat loss of the ball is given by (assuming due to radiation)

$$\frac{d\theta}{dt} = -2.2067 \times 10^{-12}(\theta^4 - 81 \times 10^8)$$

where θ is in K and t in seconds. Find the temperature at $t = 480$ seconds using the Euler's method and the Runge-Kutta 2nd order method with $a_2 = \frac{1}{2}$, 1 and $\frac{2}{3}$ which are known as the Heun's method, midpoint method and the Ralston's method respectively. Compare your results with the exact result which is $\theta(480) = 647.57$. Make plots to show this comparision by considering different step sizes.