MA 202 | Numerical Methods

Tutorial 1

INSTRUCTIONS

- Tutorial problems need to be worked on during the tutorial session. Students must submit the solutions by the end of the respective tutorial session. **The deadline is 4:30 PM on the same day**. The additional 30 minutes is provided so that students will have necessary time to scan documents, collate and upload all the files, and submit.
- You are strongly encouraged to write a computer program in Matlab to solve the equations. If this is not possible (for instance, because you do not have a PC/laptop), you should write a pseudocode and workout iterations manually as much as possible.
- **Please submit all documents (including writeup, report, Matlab program files) in a single ZIP file. Name the zip file as: Rollnumber.zip. For example, if your roll number is 18110110, name your submission as 18110110.zip.**

Problem T1*

Newton's law of cooling says that the temperature of a body changes at a rate proportional to the difference between its temperature and that of surrounding medium (the ambient temperature).

$$\frac{dT}{dt} = -k(T - T_a)$$

where, T = the temperature of the body (° C), t = time (min), k = the proportionality constant (per minute), and T_o = the ambient temperature (° C). Suppose that a cup of coffee originally has a temperature of 68 °C. Use Euler's method to compute the temperature from t = 0 to 10 min using step size of 1 min if T_a = 21 ° C and k = 0.017 /min

Problem T2*

The derivative of $f(x) = 1/(1-3x^2)$ is given by

$$\frac{6x}{(1-3x^2)^2}$$

Do you expect to have difficulties evaluating this function at x = 0.577? Try it using 3 and 4 digit arithmetic with chopping.