1. (a) Determine an upper bound on the error for Euler’s Method to solve the IVP:

\[ y' = -6xy, \quad y(0) = 7 \]

from \( x = 0 \) to \( x = 1 \), with \( h = 0.25 \).

(b) Solve the above equation at \( x = 1 \) using Euler’s Method.

(c) Compare the bound obtained in (a) with the actual error obtained from (b).
(Exact solution is \( y(x) = 7e^{-3x^2} \)).
2. Derive the following predictor-corrector formula:

\[ y_1^{(0)} = y_0 + hf(t_0, y_0) \]

\[ y_{i+1}^{(k)} = y_i + \frac{h}{2}[f(t_i, y_i) + f(t_{i+1}, y_{i+1}^{(k-1)})], \quad k = 1, 2, \ldots \]

Apply this formula to obtain an approximation of \( y(0.2) \) of the IVP: \( y' = t - \frac{1}{y}, \quad y(0) = 1, \quad h = 0.1 \) with four digits accuracy.

3. Given

\[ y' = -y^2 \]

\[ y(1) = 1 \]

and \( h = 0.1 \)

Apply Four-Step Adams-Bashforth formula to compute \( y(1.4), y(1.5) \) and \( y(1.6) \). Tabulate the results with approximate and exact values and errors.

(Exact solution: \( y(t) = \frac{1}{t} \))