1. For the IVP:

\[ y' = \frac{t^2 + y^2}{2}, \quad y(0) = 0 \]

\[ 0 \leq t \leq 4 \]

Compare the true solution with the approximate solutions from \( t = 0 \) to \( t = 4 \), with the step size \( h = 0.5 \), obtained by each of the following methods.

(a) Euler’s method

(b) Modified Euler’s method

(c) Heun’s method

(d) Midpoint method
Present your results both in tabular and graphical forms. Your tabulated results must contain the exact value, approximate value by each method at

\[ t = 0, t = 0.5, t = 1, t = 1.5, t = 2, t = 2.5, t = 3, t = 3.5 \]

and \( t = 4 \), and percentage errors.

2. Apply Euler-trapezoidal predictor-corrector method to the IVP in problem 1 to approximate \( y(2) \), by choosing two values of \( h \), for which the iteration converges. Compare the results with those obtained by the methods in Problem 1. Present the results in tabular form.