1) Write a program based on Euler’s method for solving the initial-value problem defined by \( f(t, x) = (tx - x^2)/t^2 \) on the interval \([1, 3]\) with initial condition \( x(1) = 2 \). The true solution for this problem is given in Example 1 in Sect. 8.3 of the book. Given \( n \), let \( h = 2/(n - 1) \), and let \( 1 = t_1 < \cdots < t_n = 3 \) be equally spaced points in \([1, 3]\). Let \( x_1, \ldots, x_n \) be the numerical solution.

a) For each \( k = 1, \ldots, n \), print \( t_k, x_k, true(t_k), error_k \).

b) Compute and print the maximum difference between the true solution and your solution at the points \( t_1, \ldots, t_n \).

c) Plot the piecewise linear interpolant corresponding to your solution.

2) Run your program with \( n = 20 \) and turn in the above table of values, max error, and plot. Redo with \( n = 40 \).

3) Modify your program to solve the same problem using the Taylor method of order two. Run it with \( n = 20 \) and \( n = 40 \) and turn in the same output as above.