Consider the second-order nonlinear ordinary differential equation boundary value problem.

$$\frac{d^2 y}{dt^2} + \sin \left( \frac{d^2 y}{dt^2} \right) = \frac{dy}{dt} - y$$  \hspace{1cm} (1)

with the boundary conditions

$$y(t_o) = y_o \quad \text{and} \quad y(t_f) = y_f$$  \hspace{1cm} (2)

Provide a detailed step-by-step algorithm of how you numerically obtain an approximate solution to this problem. Write the equations for specific examples of algorithms, e.g. Newton-Raphson or Euler, where used. Indicate loops where necessary.