$$y''(t) + \sin(y(t)) = 0, \quad y(0) = 1, \quad y'(0) = 0$$

CONVERT TO FIRST ORDER SYSTEM

$$y^{(n)} = f(t, y, y', \ldots, y^{(n-1)}) = y''(t) = -\sin(y(t))$$

$$y_1 = y, \quad y_2 = y', \quad y_3 = y'', \quad \ldots, \quad y_n = y^{(n-1)}$$

$$y_1 = y, \quad y_2 = y', \quad y_3 = y''$$

$$y_1' = y_2, \quad y_2' = y_3$$

$$y''(t) + \sin(y(t)) = 0$$

$$y_2'(t) + \sin(y(t)) = 0$$