Q.01 $\theta_1' = \theta_2$ | $\theta = \theta_1$

$\theta_2' = -\frac{g}{L} \sin \theta_1$

i) $\frac{d\theta_1}{dt} = f_1(t, \theta_1, \theta_2) = \theta_2$

$\frac{d\theta_2}{dt} = f_2(t, \theta_1, \theta_2) = -\frac{g}{L} \sin \theta_1$

Initial conditions:

$\theta(t=0) = 0$, and $\left.\frac{d\theta}{dt}\right|_{t=0} = 0$

$\Rightarrow \theta_1[0] = \theta_0$ $\quad \theta_2[0] = 0$, $L = 10$ cm

→ Solve using simple Euler's method.

ii) $\theta_0 = 10°$

Simple Euler: $y(x_0 + h) = y_0 + h f_0$

↳ function:

↳ Euler_Cb (x, x_0, y_0, z_0, f_y, f_z, tolerance)

return value at x.

$x = t$, $\quad \theta_1 = y$, $\quad \theta_2 = z$

$\frac{dy}{dt} = z$ $\qquad \frac{dz}{dt} = \left(-\frac{g}{L}\right) \sin(y)$

$$\boxed{x_0 = 0, \quad y_0 = \theta_0, \quad z_0 = 0 = \frac{d\theta_1}{dt}}$$