

Problem 1: Solve the initial value problem

$$y'' + y' = f(t) + \delta(t - 2\pi), \quad y(0) = 0, \quad y'(0) = 1$$

$$\text{where } f(t) = \begin{cases} \sin 2t, & 0 \leq t < \pi; \\ 0, & t \geq \pi. \end{cases}$$

Problem 2: Solve the integral equation

$$y'(t) = t + \int_0^t y(\tau) \cos(t - \tau) d\tau, \quad y(0) = 4.$$