電腦在工程數學應用—作業五

HW1: Solve the second order ODE

$$\ddot{x}(t)) + 2\xi\omega\dot{x}(t) + \omega^2 x(t) = sin(\bar{\omega}t)$$

subjected to initial conditions

$$x(0) = 0, \dot{x}(0) = 0$$

Solve $x(t)$ and plot $x(t)$.

Table 1: Six cases for different parameters

ODE	ξ	ω	$\bar{\omega}$
Case.1	0.05	2π	4π
Case.2	0.05	2π	2π
Case.3	0.05	2π	1.99π
Case.4	0	2π	4π
Case.5	0	2π	2π
Case.6	0	2π	1.99π

HW2: Solve the first order ODE of Bernouli form

$$y'(x) - ay(x) = -by^2(x)$$

HW3: Population growth model

$$\dot{y}(t) = (r - ay(t))y(t)$$

HW4: Newton's law of cooling

$$\dot{T}(t) = k(T(t) - T_s)$$

HW5: Parachute model

$$m\frac{dv(t)}{dt} = mg - kv(t)$$

HW6: Find Wronskian of $sin(x)$ and $cos(x)$.

HW7: Find particular solution of

$$y'' + 4y' + 4y = sin(x)$$