Homework No.3
Due 12:00 am, April 6, 2009
NOTE: Submit to Lab. 721 !!

1. Determine the homogeneous and particular solutions for the system described by the following differential equation for the given inputs and initial conditions：

$$\frac{d^2}{dt^2}y(t) + 4y(t) = 3\frac{d}{dt}x(t), \quad y(0^-) = -1, \frac{d}{dt}y(t)\big|_{t=0^-} = 1$$

(a) $x(t) = t$

(b) $x(t) = e^{-t}$

(c) $x(t) = \cos(t) + \sin(t)$

2. Determine the homogeneous and particular solutions for the system described by the following difference equation for the given inputs and initial conditions：

$$y[n] - \frac{1}{4}y[n-1] - \frac{1}{8}y[n-2] = x[n] + x[n-1], \quad y[-1] = 1, \; y[-2] = 0$$

(a) $x[n] = nu[n]$

(b) $x[n] = (\frac{1}{8})^n u[n]$

(c) $x[n] = e^{j\frac{\pi}{4}n} u[n]$

3. Consider a system whose input $x(t)$ and output $y(t)$ satisfy first-order differential equation：

$$\frac{dy(t)}{dt} + 2y(t) = x(t)$$

The system also satisfies the condition of initial rest; determine the system output $y(t)$ when the input is $x(t) = e^{3t}u(t)$.