ECE-205 : Dynamical Systems

Homework #4

Due : *Friday March 29, 2012 at 5 PM*

1) Problem 4.1 from the Notes

2) For each of the following mathematical description of a system, determine if the system is linear, time invariant, causal, and memoryless and fill in the following table. Unless the system does not meet the homogeneity condition, you must use a formal technique to show the system is linear. If it does not meet the homogeneity condition, you must give an example. For the memoryless and causal you can just say it's obvious (assuming it is).

System	Linear (Y/N)	Time Invariant (Y/N)	Memoryless (Y/N)	Causal (Y/N)
$\ddot{y}(t) - \sin(t)\dot{y}(t) + y(t) = x(t)$				
$y(t) = e^{x(t)}$				
$\ddot{y}(t) = \sin(x(t))$				
$y(t) = \int_{-\infty}^{t} \cos(\lambda)x(\lambda)d\lambda$				
$y(t) = \int_{-\infty}^{t} (\lambda+1)x(\lambda)d\lambda$				
$y(t) = 2 + \int_{-\infty}^{t} e^{-\lambda}x(\lambda)d\lambda$				
$\dot{y}(t) + y(t) = x(t) + 2$				

Answers: 3 are L, 3 are TI, 1 is memoryless, 7 are causal