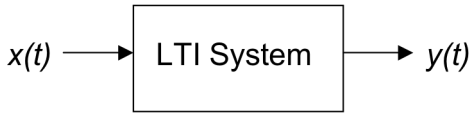
Signals & Systems
Student ID Number: _____

Unified Engineering Spring 2008
Quiz 3
Wednesday April 16

Total: 20 points

S1) A LTI system has input *x(t)* and output *y(t)*.



The input and output of the LTI system satisfy the following differential equation

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

The input is a periodic function of time that produces the following periodic output

$$y(t) = 2\cos(t - \pi/4)$$

a) [2pts] Determine $H(j\omega)$, the input/output frequency response, of the LTI system

b) [1pt] What is *T,* the period of the output *y(t)*?

c) [1pt] What is ω_0, the fundamental frequency of the output *y(t)*?

d) [4pts] Show that the Fourier coefficients of the output *y(t)* are-

$$b_1 = e^{-j(\pi/4)}$$
$$b_{-1} = e^{j(\pi/4)}$$
$$b_k = 0 \quad k \neq \pm 1$$

e) [2pts] What is the period of the input *x(t)?*

f) [6pts] Determine the Fourier coefficients of the input *x(t)*

g) [4pts] Write the input *x(t)* as a real function of time (i.e., not as a complex variable)

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