EECS20n, Quiz 8, 05/07/04

Last Name _____ First _____ Lab time _____

Let the continuous-time signal c given by

$$\forall\, t \in Reals, \quad c(t) = 2\cos(\omega_c t)$$

be a carrier wave for a radio signal. Let x given by

$$\forall\, t \in Reals, \quad x(t) = 2\cos(\omega_x t)$$

be the signal to be carried by that radio signal (that it, it is a highly simplified stand-in for, say, a voice signal). To be concrete, let $\omega_c = 2\pi \cdot 8000$ radians/second, and $\omega_x = 2\pi \cdot 400$ radians/second.

1. Find and sketch the CTFT Y of y where

$$\forall\, t \in Reals, \quad y(t) = c(t)x(t).$$

   Label your sketch carefully. **Hint**: The CTFT of $e^{i\omega_0 t}$ is $2\pi\delta(\omega - \omega_0)$.

2. Let y from part 1 be the input to an LTI system with frequency response H where

$$\forall\, \omega \in Reals, \quad H(\omega) = \begin{cases} 0 & \text{if } \omega \le 0 \\ 1 & \text{if } \omega > 0 \end{cases}$$

   Find the output u as a function of t.