

Name \_\_\_\_\_ CM \_\_\_\_\_

ECE-300, Quiz #3

- 1) The impulse response of the mathematical model of a system  $y(t) = 2x(t-1)$  is  
a)  $h(t) = \delta(t)$    b)  $h(t) = 2\delta(t)$    c)  $h(t) = 2\delta(t-1)$    d)  $h(t) = 2u(t-1)$
- 2) The impulse response of the mathematical model of a system  $y(t) = \int_{-\infty}^{t-1} x(\lambda)d\lambda$  is  
a)  $h(t) = u(t)$    b)  $h(t) = 1$    c)  $h(t) = u(t-1)$    d)  $h(t) = t-1$
- 3) The impulse response of the mathematical model of a system  $y(t) = \int_{-\infty}^{t-1} \lambda x(\lambda-2)d\lambda$  is  
a)  $h(t) = 2u(t-1)$    b)  $h(t) = 2u(t-2)$    c)  $h(t) = 2u(t-3)$    d)  $h(t) = 2u(t)$
- 4) The impulse response of the mathematical model of a system  $y(t) = \int_t^{\infty} \lambda x(\lambda-2)d\lambda$  is  
a)  $h(t) = 2u(t)$    b)  $h(t) = 2u(2-t)$    c)  $h(t) = 2u(t-2)$    d)  $h(t) = 2u(t)$
- 5) The impulse response of the mathematical model of a system  $\dot{y}(t) + 2y(t) = 3x(t)$  is  
a)  $h(t) = 3e^{-2t}u(t)$    b)  $h(t) = 3e^{2t}u(t)$    c)  $h(t) = 3u(t)$    d)  $h(t) = 6u(t)$
- 6) Is the system described by the mathematical model  $y(t) = \sin\left(\frac{1}{x(t)}\right)$  BIBO stable?  
a) yes   b) no
- 7) Is the system described by the mathematical model  $y(t) = e^{x(t)}$  BIBO stable?  
a) yes   b) no
- 8) Consider an unknown system. When the input to the system is  $x(t) = 2\cos(2t)$  the output of the system is  $y(t) = 2\cos(2t) + \cos(4t)$ . Is the system **linear**?  
a) Yes   b) No   c) Can't tell, not enough information
- 9) The **unit step response** of a system is  $s(t) = e^{-t}u(t)$ . The **impulse response** of this system is  
a)  $h(t) = -e^{-t}u(t)$    b)  $h(t) = -e^{-t}u(t) + \delta(t)$    c)  $h(t) = -e^{-t}u(t) + e^{-t}$    d)  $h(t) = -te^{-t}u(t)$

For Problems 10-13, consider the system modeled by the differential equation

$$\dot{y}(t) + t^2 y(t) = \sin(t)x(t)$$

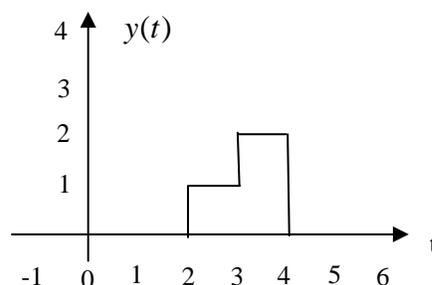
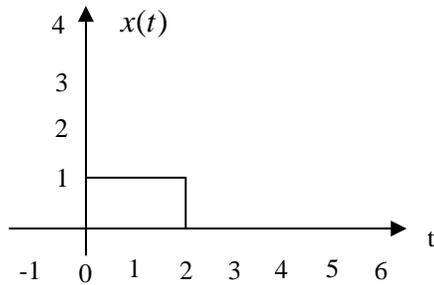
10) Is the model **linear**? a) Yes b) No

11) Is the model **time-invariant**? a) Yes b) No

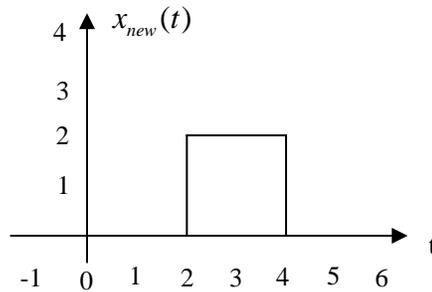
12) Is the system **memoryless**? a) Yes b) No

13) Is the system **causal**? a) Yes b) No

14) Assume we know a system is a linear time invariant (LTI) system. We also know the following input  $x(t)$  – output  $y(t)$  pair:



If the input to the system is now  $x_{new}(t)$



Which of the following best represents the output of the system?

a)  $y_a(t)$  b)  $y_b(t)$  c)  $y_c(t)$  d)  $y_d(t)$

