

## ECE-205 Practice Quiz 4

Fill in the following table with a Y (yes) or N (no) for each of the system models given. Assume  $-\infty < t < \infty$  for all of the systems and all initial conditions are zero.

System	System Model	Linear?	Time-Invariant?	Causal?	Memoryless?
1	$y(t) = 3\sin(t+1)x(t-1)$				
2	$y(t) = x\left(\frac{t}{2}-1\right)$				
3	$y(t) = x(1-t)$				
4	$\dot{y}(t) + t^2y(t) = \sin(t)x(t)$				
5	$y(t) = \int_{-\infty}^t e^{-(t-\lambda)}x(\lambda+1)d\lambda$				
6	$y(t) = 3e^{t+1}x(t)$				
7	$y(t) = x\left(\frac{t}{2}\right)$				
8	$y(t) = \frac{1}{2}[x(t-1) + x(t+1)]$				
9	$\dot{y}(t) + y(t) = x(t) + 2$				
10	$y(t) = e^{x(t)}$				

11) For a system with input  $x(t)$  and output  $y(t)$ , is it necessary for  $y(t_0) = 0$  in order for the system to be **linear**?

a) Yes b) No

12) For a system with input  $x(t)$  and output  $y(t)$ , is it necessary for  $y(t_0) = 0$  in order for the system to be **time-invariant**?

a) Yes b) No

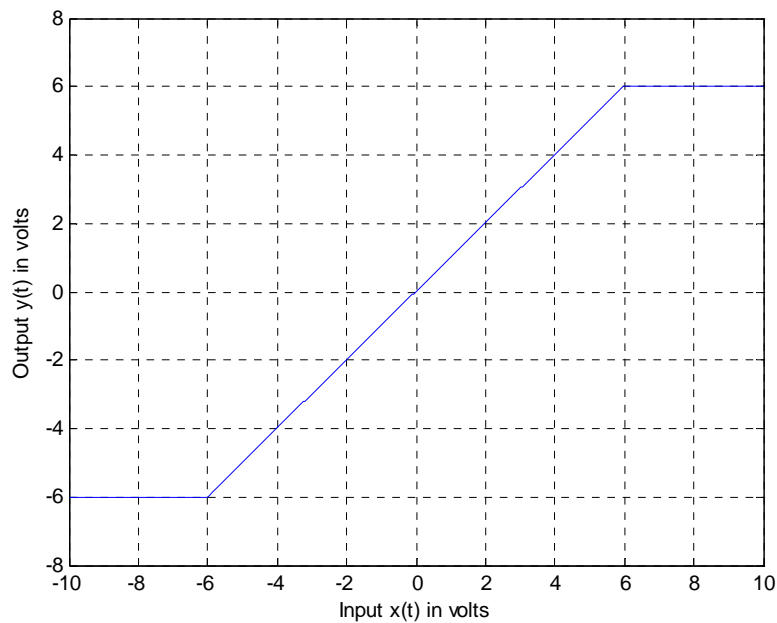
13) For a system with input  $x(t)$  and output  $y(t)$ , is it necessary for  $y(t_0) = 0$  in order for the system to be **causal**?

a) Yes b) No

14) For a system with input  $x(t)$  and output  $y(t)$ , is it necessary for  $y(t_0) = 0$  in order for the system to be **memoryless**?

a) Yes b) No

Problems 15 and 16 refer to a system with an input/output relationship shown below



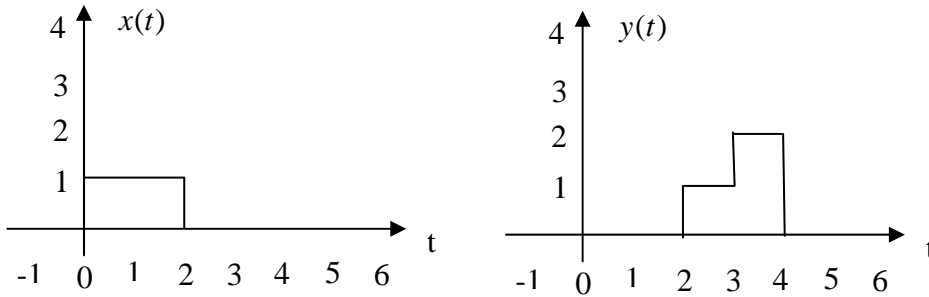
15) Is this a **linear** system? a) Yes b) No

16) Is this an **invertible** system? a) Yes b) No

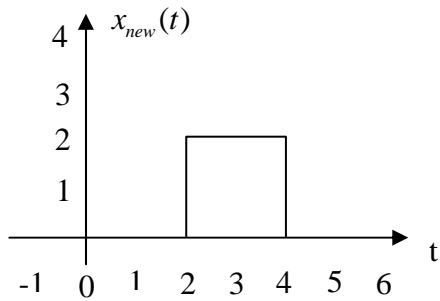
17) Is the system  $y(t) = mx(t) + b$  and **invertible** system? a) Yes b) No

18) Is the system  $y(t) = \cos(x(t)) + 1$  an **invertible** system? a) Yes b) No

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

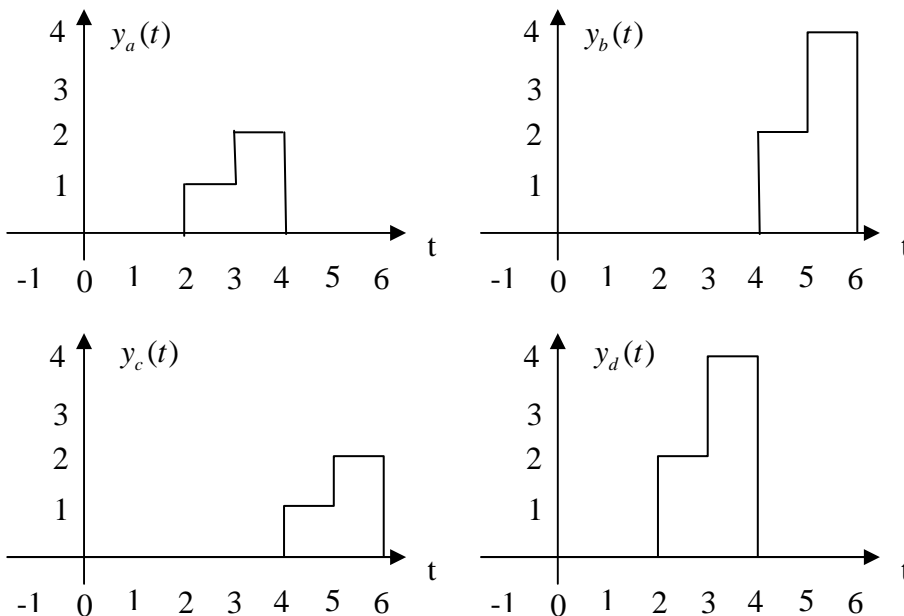


If the input to the system is now  $x_{new}(t)$



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

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



*Answers:*

*1-L, not TI, C, not M; 2-L, not TI, not C, not M, 3-L, not TI, not C, not M, 4-L, not TI, C, not M,*

*5- L, TI, not C, not M, 6-L, not TI, C, M, 7-L, not TI, not C, not M, 8-L, TI, not C, not M*

*9-not L, TI, C, not M, 10- not L, TI, C, M*

*11- a, 12-a, 13-b, 14-b, 15-b, 16-b, 17-a, 18-b, 19-b*