

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

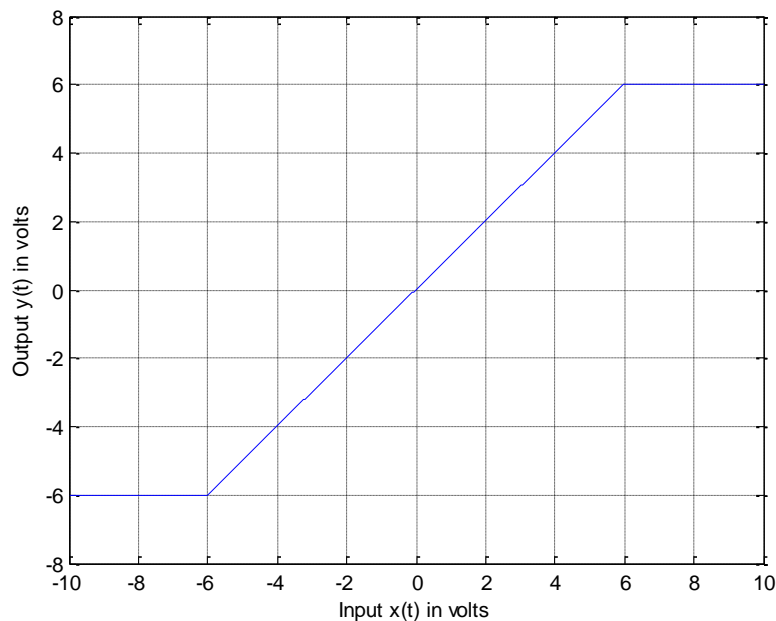
13) For a system with input $x(t)$ and output $y(t)$, is it necessary for $y(t_0) = 0$ in order for the system to be **causal**?

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



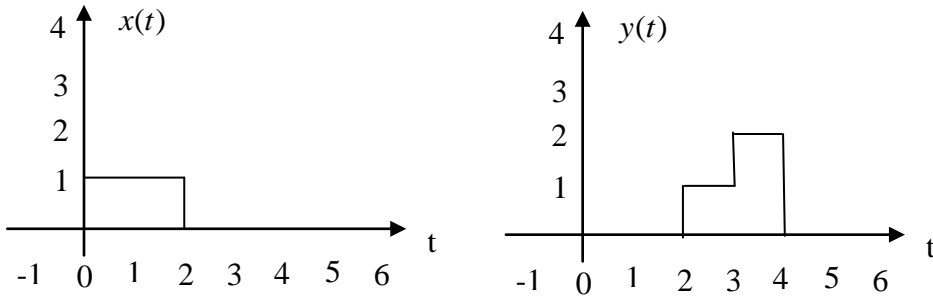
15) Is this a **linear** system? a) Yes b) No

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

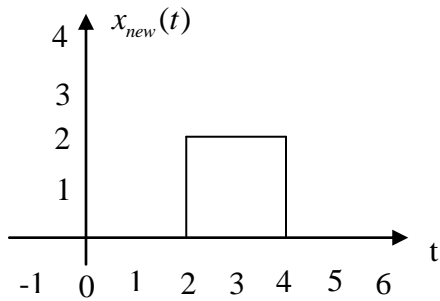
17) Is the system $y(t) = mx(t) + b$ and **invertible** system? a) Yes b) No

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:

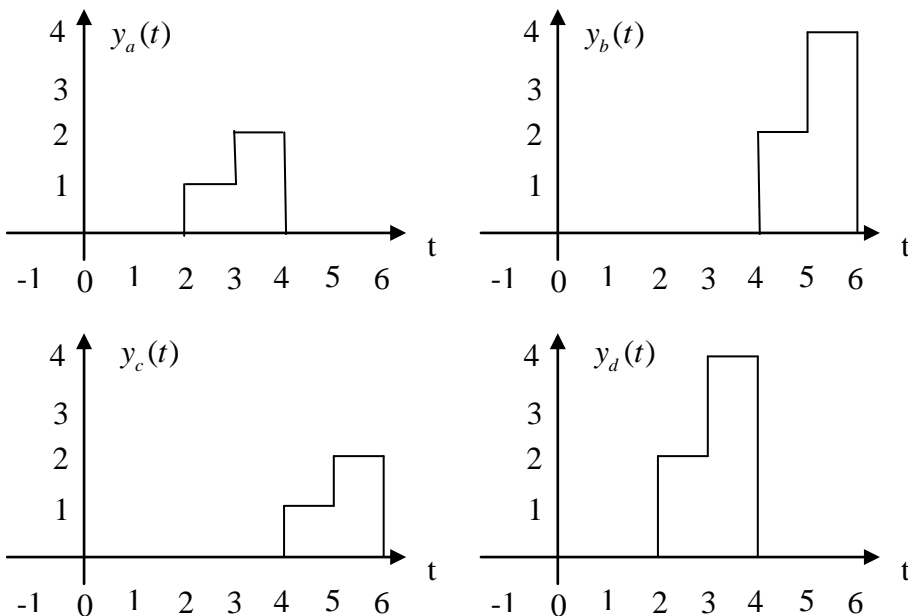


If the input to the system is now $x_{new}(t)$



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