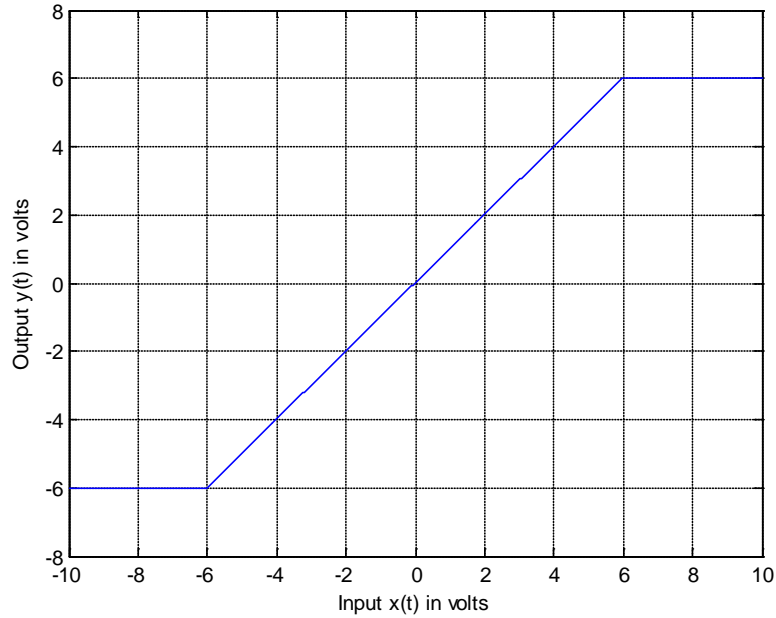# ECE-205 Practice Quiz 3

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	$y(t) = x\left(\dfrac{t}{2}-1\right)$				
3	$y(t) = x(1-t)$				
4	$\dot{y}(t) + t^2 y(t) = \sin(t)x(t)$				
5	$y(t) = \displaystyle\int_{-\infty}^{t} e^{-(t-\lambda)}x(\lambda+1)d\lambda$				
6	$y(t) = 3e^{t+1}x(t)$				
7	$y(t) = x\left(\dfrac{t}{2}\right)$				
8	$y(t) = \dfrac{1}{2}\left[x(t-1)+x(t+1)\right]$				
9	$\dot{y}(t) + y(t) = x(t) + 2$				
10	$y(t) = e^{x(t)}$				

Problems 11 and 12 refer to a system with an input/output relationship shown below

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

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

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

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

15) If we made the variable substitution $\sigma = \dfrac{\lambda}{2}$ in the integral $\int_{2}^{6} x\left(\dfrac{\lambda}{2}\right) d\lambda$, the new integral is

a) $\dfrac{1}{2}\int_{2}^{6} x(\sigma)d\sigma$ b) $2\int_{2}^{6} x(\sigma)d\sigma$ c) $\dfrac{1}{2}\int_{1}^{3} x(\sigma)d\sigma$ d) $2\int_{1}^{3} x(\sigma)d\sigma$ e) none of these

16) If we made the variable substitution $\sigma = \lambda - 1$ in the integral $\int_{-\infty}^{t} e^{\lambda} x(\lambda - 1)d\lambda$, the new integral is

a) $\int_{-\infty}^{t-1} e^{\sigma+1} x(\sigma)d\sigma$ b) $\int_{-\infty}^{t} e^{\sigma+1} x(\sigma)d\sigma$ c) $\int_{-\infty}^{t} e^{\sigma} x(\sigma)d\sigma$ d) $2\int_{-\infty}^{t-1} e^{\sigma} x(\sigma)d\sigma$ e) none of these

17) If we made the variable substitution $\sigma = 1 - 2\lambda$ in the integral $\int_0^5 x(1-2\lambda)d\lambda$, the new integral is

a) $\int_0^5 x(\sigma)d\sigma$ b) $\dfrac{-1}{2}\int_0^5 x(\sigma)d\sigma$ c) $\dfrac{1}{2}\int_{-9}^1 x(\sigma)d\sigma$ d) $\int_{-9}^1 x(\sigma)d\sigma$ e) none of these

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-b, 12-b, 13-a, 14-b, 15-d, 16-a, 17-c