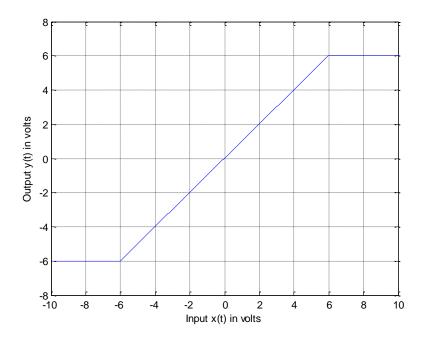
## ECE-205 Practice Quiz 4

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-	Causal?	Memoryless?
			Invariant?		
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	$y(t) = \frac{1}{2} \left[ x(t-1) + x(t+1) \right]$				
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**) If we made the variable substitution  $\sigma = \frac{\lambda}{2}$  in the integral  $\int_{2}^{6} x \left(\frac{\lambda}{2}\right) d\lambda$ , the new integral is
- a)  $\frac{1}{2} \int_{2}^{6} x(\sigma) d\sigma$  b)  $2 \int_{2}^{6} x(\sigma) d\sigma$  c)  $\frac{1}{2} \int_{1}^{3} x(\sigma) d\sigma$  d)  $2 \int_{1}^{3} x(\sigma) d\sigma$  e) none of these
- **20**) 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

- 21) 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)  $\frac{-1}{2}\int_{0}^{5} x(\sigma)d\sigma$  c)  $\frac{1}{2}\int_{-9}^{1} x(\sigma)d\sigma$  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- a, 12-a, 13-b, 14-b, 15-b, 16-b, 17-a, 18-b, 19-d, 20-a, 21-c