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ECE-205 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	$y(t) = e^{t-1}x(t+1)$				
2	$y(t) = x\left(t - \frac{1}{2}\right)$				
3	$y(t) = x(1-t)$				
4	$\dot{y}(t) + y(t) = e^{-t}x(t)$				
5	$y(t) = \int_{-\infty}^{t} e^{-(t-\lambda)}x(\lambda+1)d\lambda$				
6	$y(t-1) = \cos(t)x(t)$				
7	$y(t) = x\left(\frac{t}{2}\right)$				
8	$y(t) = \frac{1}{2}\left[x(t-1) + x(t+1)\right]$				

9) 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

10) 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

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11) If we have the integral $y(t)=\int_{1}^{t} e^{-\lambda}x(\lambda-T)d\lambda$ and we make the substitution $\sigma=\lambda-T$, the resulting integral is

a) $y(t)=\int_{1}^{t} e^{-\sigma-T}x(\sigma)\,\mathrm{d}\sigma$ b) $y(t)=\int_{1}^{t-T} e^{-\sigma-T}x(\sigma)\,\mathrm{d}\sigma$ c) $y(t)=\int_{1-T}^{t-T} e^{-\sigma-T}x(\sigma)\,\mathrm{d}\sigma$ d) none of these

12) If we have the integral $y(t)=\int_{1}^{t} e^{-\lambda}x(-2\lambda)d\lambda$ and we make the substitution $\sigma=-2\lambda$, the resulting integral is

a) $y(t)=-2\int_{1}^{t} e^{-\sigma/2}x(\sigma)d\sigma$ b) $y(t)=-\frac{1}{2}\int_{1}^{-2t} e^{-\sigma/2}x(\sigma)d\sigma$ c) $y(t)=-\frac{1}{2}\int_{-2}^{-2t} e^{-\sigma/2}x(\sigma)d\sigma$ d) none of these

13) If we have the integral $y(t)=\int_{-\infty}^{t} e^{-(t-\lambda)}x(2-3\lambda)d\lambda$ and we make the substitution $\sigma=2-3\lambda$, what do we get? (write out the answer, don't worry about simplifying it)