Name _____ CM_____

ECE-300, Quiz #3

1) The integral $\int_{-\infty}^{\infty} u(t+1)u(t-2)e^{-t}dt$ can be simplified as

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

2) The integral $\int_{-\infty}^{\infty} u(-1-\lambda)e^{-|\lambda|}d\lambda$ can be simplified as

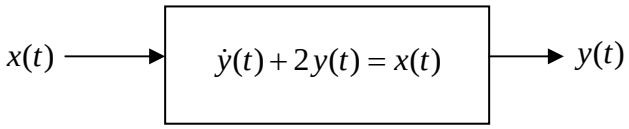
a) $\int_{-\infty}^{-1} e^{-|\lambda|}d\lambda$ b) $\int_{-1}^{\infty} e^{-|\lambda|}d\lambda$ c) $\int_{1}^{\infty} e^{-|\lambda|}d\lambda$ d) none of these

3) Consider an unknown system. When the input to the system is $x(t) = 2\cos(2t)$ the output of the system is $y(t) = 2\cos(2t) + \cos(4t)$. Is the system **linear**?

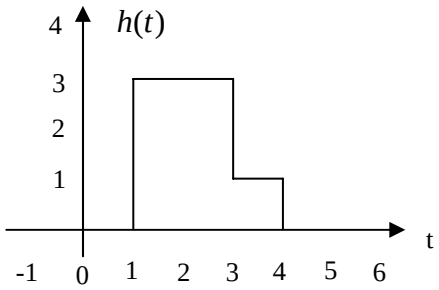
a) Yes b) No c) Can't tell, not enough information

4) The **impulse response** for the system below is

a) $h(t) = e^{-2t}u(t)$ b) $h(t) = e^{t^2}u(t)$ c) $h(t) = 2e^{-t}u(t)$ d) $h(t) = e^{-t^2}u(t)$



5) The **impulse response** of an LTI system is shown below:



Is the system **causal**? a) Yes b) No

6) Assume the **impulse response** of an LTI system is $h(t)$. If the input to this system is $x(t) = \delta(t) + 2\delta(t-2)$, the system output will be

a) $y(t) = u(t) + 2u(t-2)$ b) $y(t) = h(t)u(t) + 2h(t-2)u(t-2)$ c) $y(t) = h(t) + 2h(t-2)$

7) The **unit step response** of a system is $s(t) = e^{-t}u(t)$. The **impulse response** of this system is

a) $h(t) = -e^{-t}u(t)$ b) $h(t) = -e^{-t}u(t) + \delta(t)$ c) $h(t) = -e^{-t}u(t) + e^{-t}$ d) $h(t) = -te^{-t}u(t)$

For Problems 8-11, consider the system modeled by the differential equation

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

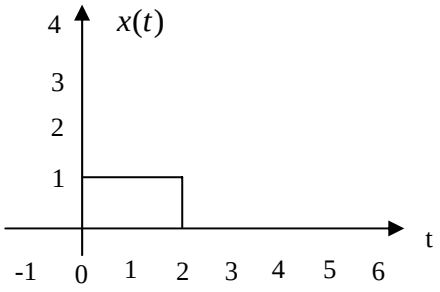
8) Is the model **linear**? a) Yes b) No

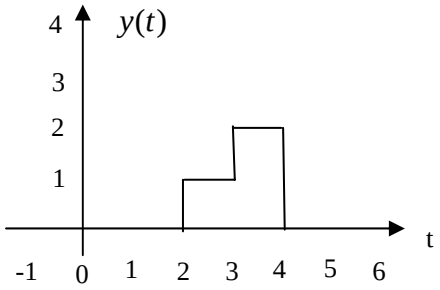
9) Is the model **time-invariant**? a) Yes b) No

10) Is the system **memoryless**? a) Yes b) No

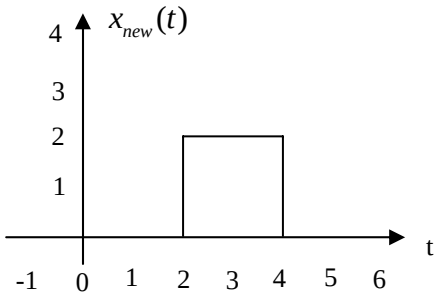
11) Is the system **causal**? a) Yes b) No

12) 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) $y_d(t)$