

Name \_\_\_\_\_ CM \_\_\_\_\_

### Quiz 4

1) The **impulse response** for the LTI system  $y(t) = \int_{-\infty}^{t+1} e^{-(t-\lambda)} x(\lambda - 3) d\lambda$  is

- a)  $h(t) = e^{-(t-3)} u(t)$     b)  $h(t) = e^{-(t-3)} u(t+1)$     c)  $h(t) = e^{-(t-3)} u(t-3)$   
d)  $h(t) = e^{-(t-3)} u(t-2)$     e)  $h(t) = e^{-(t-3)} u(t-1)$     f) none of these

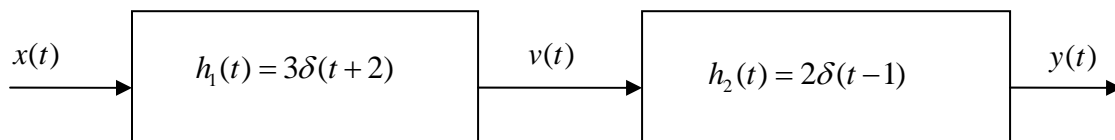
2) The **impulse response** for the LTI system  $y(t) = x(t-1) + \int_{-\infty}^{t-2} e^{-(t-\lambda)} x(\lambda - 3) d\lambda$  is

- a)  $h(t) = \delta(t-1) + e^{-(t-3)} u(t)$     b)  $h(t) = u(t-1) + e^{-(t-3)} u(t)$   
c)  $h(t) = \delta(t-1) + e^{-(t-3)} u(t-1)$     d)  $h(t) = u(t-1) + e^{-(t-3)} u(t+1)$   
e)  $h(t) = \delta(t-1) + e^{-(t-3)} u(t-3)$     f) none of these

3) The **impulse response** for the LTI system  $\dot{y}(t) - y(t) = x(t-1)$  is

- a)  $h(t) = e^{(t-1)} u(t-1)$     b)  $h(t) = e^{-(t-1)} u(t-1)$     c)  $h(t) = e^{-(t-1)} u(t)$   
d)  $h(t) = e^{(t-1)} u(t)$     e) none of these

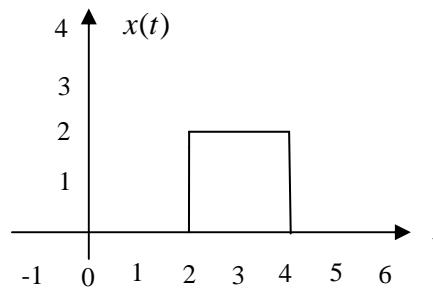
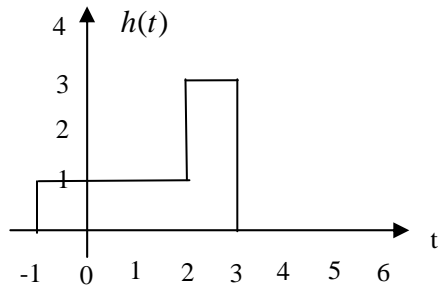
4) The **impulse response** of the system



is

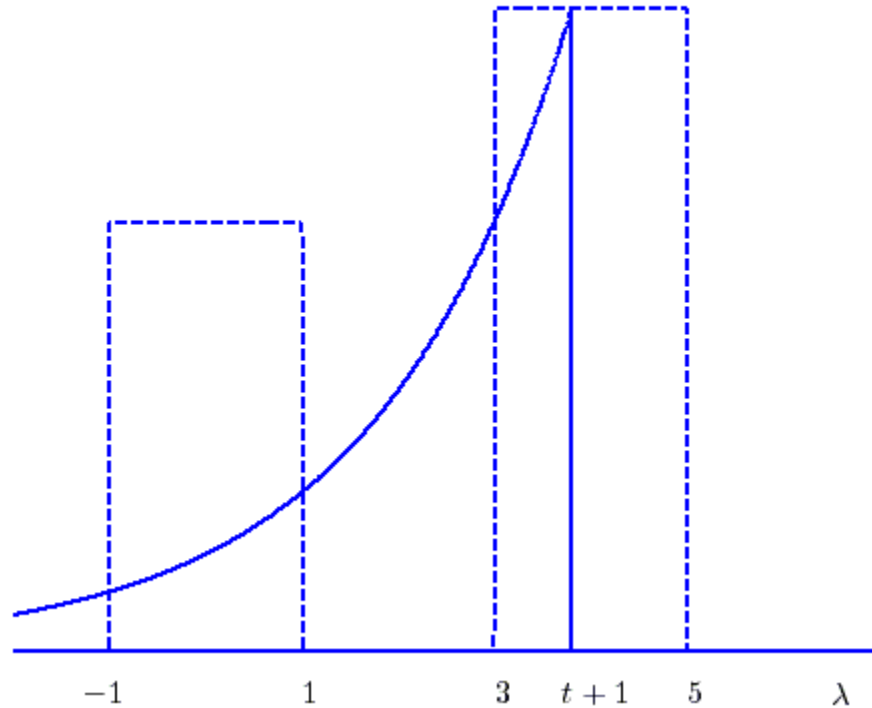
- a)  $h(t) = 6u(t)$     b)  $h(t) = 6u(t-1)$     c)  $h(t) = 6u(t+1)$   
d)  $h(t) = 6\delta(t)$     e) none of these

Problems 5 - 8 refer to the following linear time invariant (LTI) system, with impulse response  $h(t)$  shown below on the left, and input  $x(t)$  shown below on the right. The output of the system,  $y(t)$ , is the convolution of the impulse response with the input,  $y(t) = h(t) * x(t)$ .



- 5) Is this LTI system causal? a) Yes b) No
- 6) The maximum value of  $y(t)$  is a) 4 b) 5 c) 6 d) 7 e) 8
- 7)  $y(t)$  is zero until what time? a) 0 b) 1 c) 2 d) 3 e) 4
- 8)  $y(t)$  will return to zero at what time? a) 6 b) 7 c) 8 d) 9 e) 10

For problems **9-14**, assume we are convolving two functions, and at some point we have the configuration shown below:



The output at this time can be written as the sum of two integrals,

$$y(t) = \int_a^b x(\lambda)h(t-\lambda)d\lambda + \int_c^d x(\lambda)h(t-\lambda)d\lambda$$

- 9)** The value of the parameter  $a$  is a) -1 b) 1 c) 3 d) 5 e)  $t$  f)  $t+1$
- 10)** The value of the parameter  $b$  is a) -1 b) 1 c) 3 d) 5 e)  $t$  f)  $t+1$
- 11)** The value of the parameter  $c$  is a) -1 b) 1 c) 3 d) 5 e)  $t$  f)  $t+1$
- 12)** The value of the parameter  $d$  is a) -1 b) 1 c) 3 d) 5 e)  $t$  f)  $t+1$
- 13)** This sketch is valid for  
a)  $-1 < t < 1$  b)  $3 < t < 5$  c)  $0 < t < 2$  d)  $0 < t < 1$  e) none of these
- 14)** Is this a causal system? a) yes b) no c) it is not possible to tell