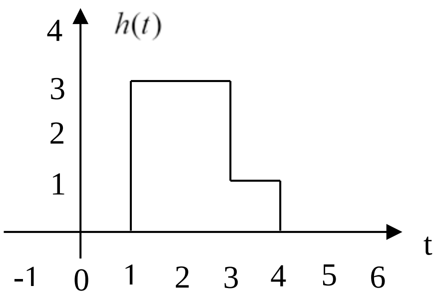
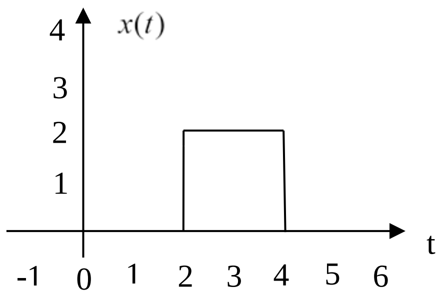
ECE-205 Practice Quiz 6

Problems **1 - 4** 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, $y(t) = h(t) * x(t)$.





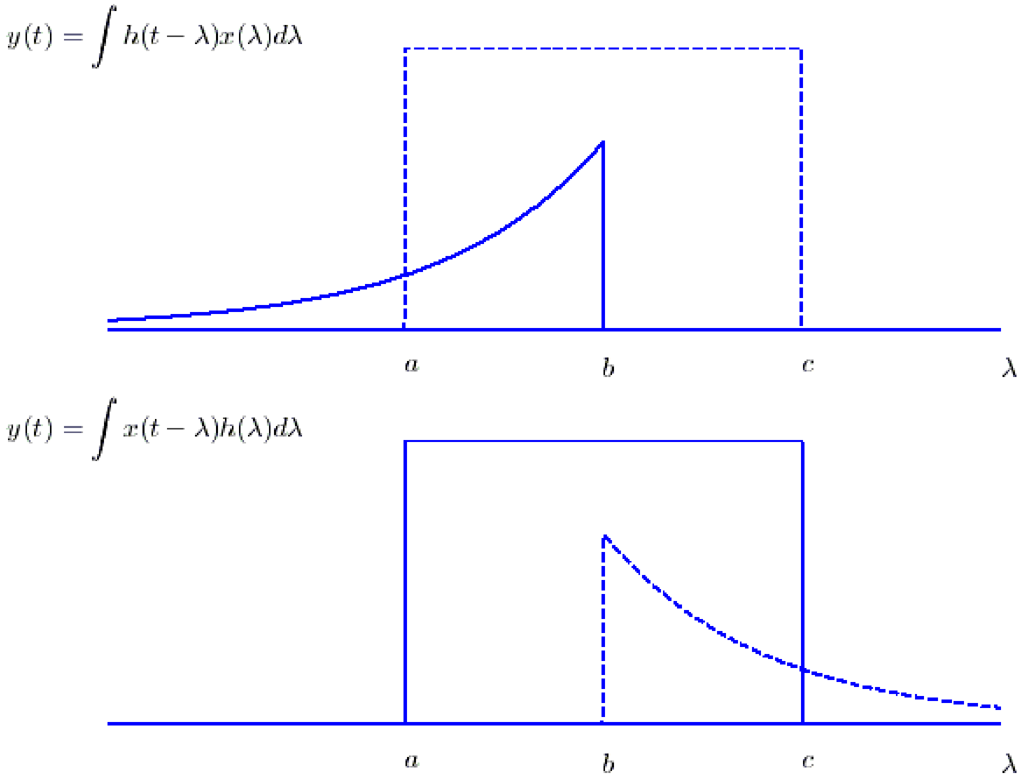
1) Is this LTI system causal? a) Yes b) No

2) The maximum value of $y(t)$ is a) 4 b) 5 c) 6 d) 12 e) 14

3) $y(t)$ is zero until what time? a) 0 b) 1 c) 2 d) 3 e) 4

4) $y(t)$ will return to zero at what time? a) 6 b) 7 c) 8 d) 9 e) 10

For problems **5-10**, assume we are going to convolve the impulse response $h(t) = 2e^{-t/0.8}u(t)$ with input $x(t) = 3[u(t+1) - u(t-1)]$.



For problems **5-7**, assume we perform the convolution using the form $y(t) = \int h(t-\lambda)x(\lambda)d\lambda$, depicted in the top panel in the above figure.

5) The parameter *a* is equal to a) 0 b) 1 c) -1 d) t e) λ f) none of these

6) The parameter *b* is equal to a) 0 b) 1 c) -1 d) t e) λ f) none of these

7) The parameter *c* is equal to a) 0 b) 1 c) -1 d) t e) λ f) none of these

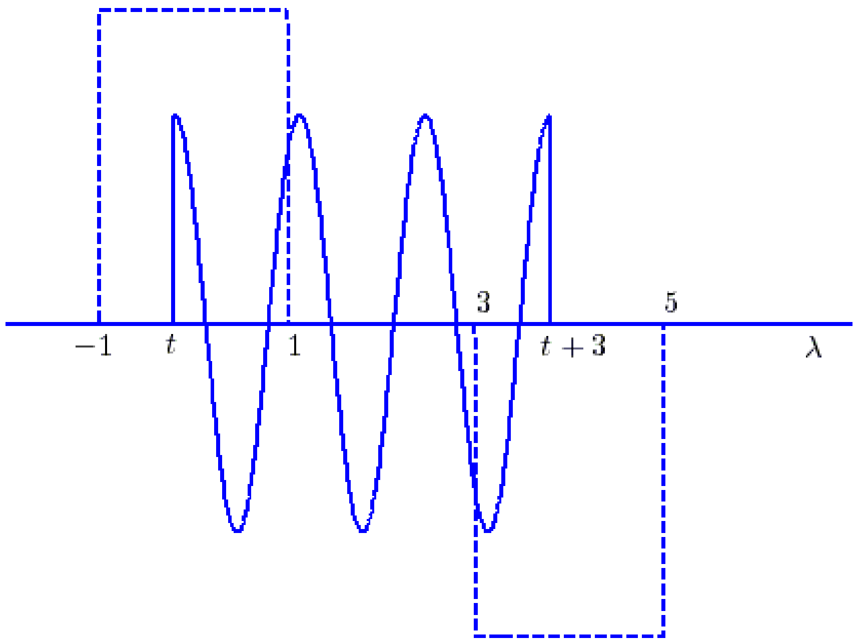
For problems **8-10**, assume we perform the convolution using the form $y(t) = \int h(\lambda)x(t-\lambda)d\lambda$, depicted in the bottom panel in the above figure.

8) The parameter *a* is equal to a) $t-1$ b) $t+1$ c) -1 d) 1 e) none of these

9) The parameter *b* is equal to a) $t-1$ b) $t+1$ c) -1 d) 1 e) none of these

10) The parameter *c* is equal to a) $t-1$ b) $t+1$ c) -1 d) 1 e) none of these

For problems **11-16**, 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,

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

11) The value of the parameter a is a) -1 b) 1 c) 3 d) 5 e) t f) $t+3$

12) The value of the parameter b is a) -1 b) 1 c) 3 d) 5 e) t f) $t+3$

13) The value of the parameter c is a) -1 b) 1 c) 3 d) 5 e) t f) $t+3$

14) The value of the parameter d is a) -1 b) 1 c) 3 d) 5 e) t f) $t+3$

15) 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

16) Is this a causal system? a) yes b) no c) it is not possible to tell

Answers:, 1-a, 2-d, 3-d, 4-c, 5-c, 6-d, 7-b, 8-a, 9-e, 10-b, 11-e, 12-b, 13-c, 14-f, 15-d, 16-b