

H6-08

1. Using the graphical method, compute and sketch $y(t) = h(t)*x(t)$ for

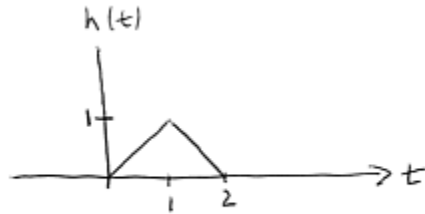
(a) $h(t) = e^{-t}u(t)$, $x(t) = 2u(t) - 2u(t-1)$

(b) $h(t) = e^{-|t|}$, $x(t) = u(t)$

(c) $h(t) = e^t u(-t)$, $x(t) = u(t-2)$

(d) $h(t) = e^{-t}u(t)$, $x(t) = u(3-t)$

2. An LTI system has the impulse response shown below:



For an input signal of the form

$$x(t) = \sum_{k=0}^{\infty} a_k \delta(t - kT)$$

sketch the output signal if

(b) $T = 2$, $a_k = 1$ $k \geq 0$

(c) $T = 3$, $a_k = (1/2)^k$ $k \geq 0$

4. Express $\hat{y}(t) = (\hat{h} * \hat{x})(t)$ in terms of $y(t) = h(t)*x(t)$ for the following signal choices.

(a) $\hat{x}(t) = x(t-1)$, $\hat{h}(t) = h(t-2)$

(b) $\hat{x}(t) = x(t-2)$, $\hat{h}(t) = h(t+2)$

(e) $\hat{x}(t) = x(-t)$, $\hat{h}(t) = h(-t)$

6. Determine if the LTI systems described by the following unit-impulse responses are stable and/or causal.

(a) $h(t) = e^{-2t}u(t+3)$

(b) $h(t) = e^{3t}u(-4-t)$

(c) $h(t) = e^{-4|t|}$

(d) $h(t) = e^t u(t-3)$

8. Determine if the DT LTI systems with the following unit-pulse responses are causal and/or stable.

(b) $h[n] = \left(\frac{1}{2}\right)^n u[-n]$

(c) $h[n] = 2^n u[3-n]$

9. For the DT LTI system with unit-pulse response $h[n] = \left(\frac{1}{2}\right)^n u[n]$, use the eigenfunction properties to compute the response to the input signals:

(a) $x[n] = 1$

(b) $x[n] = (-1)^n$

(c) $x[n] = 2 \cos(\pi n / 2)$

(d) $x[n] = 3 \sin\left(-\frac{3\pi}{2} n\right)$