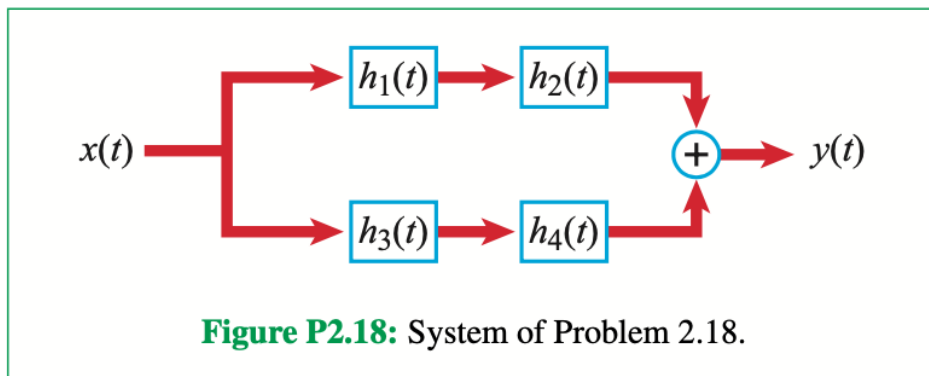


Homework # 4 EE Signals and Linear Systems

1.-

2.18 Show that the overall impulse response of the interconnected system shown in **Fig. P2.18** is $h(t) = 0$!



The impulse responses of the individual systems are

- $h_1(t) = e^{-t} u(t) - e^{-2t} u(t)$,
- $h_2(t) = e^{-3t} u(t)$,
- $h_3(t) = e^{-3t} u(t) - e^{-2t} u(t)$,
- $h_4(t) = e^{-t} u(t)$.

2. –

2.28 An LTI system has an impulse response given by

$$h(t) = 2 \cos(t) u(t).$$

Obtain the response to input $x(t) = 2 \cos(t) u(t)$ and determine whether or not the system is BIBO-stable.

3.-

2.29 An LTI system has the frequency response function $\mathbf{H}(\omega) = 1/(j\omega + 3)$. Compute the output if the input is

(a) $x(t) = 3$

(b) $x(t) = 3\sqrt{2} \cos(3t)$

(d) $x(t) = \delta(t)$

(e) $x(t) = u(t)$

(f) $x(t) = 1$

4.-

2.36 We observe the following input-output pair for an LTI system:

- $x(t) = 1 + 2 \cos(t) + 3 \cos(2t)$

- $y(t) = 6 \cos(t) + 6 \cos(2t)$

- $x(t) \rightarrow \boxed{\text{LTI}} \rightarrow y(t)$

Determine $y(t)$ in response to a new input

$$x(t) = 4 + 4 \cos(t) + 2 \cos(2t).$$