

# Example

## Example

Consider the following cascade of LTI systems:

$$x(t) \rightarrow \boxed{h_1(t)} \rightarrow \boxed{h_2(t)} \rightarrow y(t),$$

where  $h_1(t) = e^{-t}u(t)$  and  $h_2(t) = e^{-3t}u(t)$ .

- 1 Find the frequency response of the overall system.
- 2 Find the linear constant coefficient differential equation that describes this system.

(Selected from Midterm Exam 2 of Summer 2014)

## Example (1)

### Example

Show that

$$\frac{1}{a} \operatorname{rect}\left(\frac{t}{a}\right) * \operatorname{rect}\left(\frac{t}{a}\right) = \operatorname{tri}\left(\frac{t}{a}\right)$$

where  $a > 0$ .

*Hint: You may use the fact that  $\operatorname{rect}(t) * \operatorname{rect}(t) = \operatorname{tri}(t)$*