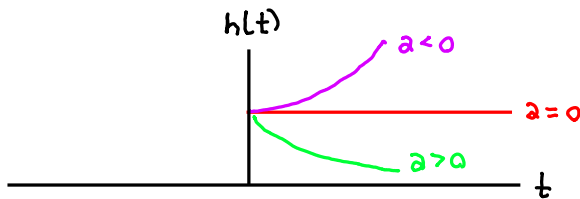**Example 4.8.** Consider the LTI system with the impulse response h given by

$$h(t) = e^{-at} u(t),$$

where a is a real constant. Determine whether this system has memory.

Solution. The system has memory since $h(t) \neq 0$ for some $t \neq 0$ (e.g., $h(1) = e^{-a} \neq 0$). ∎

condition for memorylessness violated

$h(t)$

$a < 0$

$a = 0$

$a > 0$

t

memoryless $\iff$ $h(t) = 0$ for all $t \neq 0$