



EXERCISE 9.11: For the integrator system, can you think of a specific input $x(t)$ that is bounded but whose integral grows without bound?



The integrator is $y(t) = \int_{-\infty}^t x(\tau) d\tau$

Let $x(t)$ be the unit-step signal

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

$$\text{Then } y(t) = \int_{-\infty}^t u(\tau) d\tau = \int_0^t 1 d\tau = t \quad \text{if } t \geq 0$$

As $t \rightarrow \infty$, $y(t) \rightarrow \infty$

So $x(t)$ is bounded by 1, but $y(t)$ is unbounded.