

Example 3.19 (Ideal integrator). Determine whether the system \mathcal{H} is causal, where

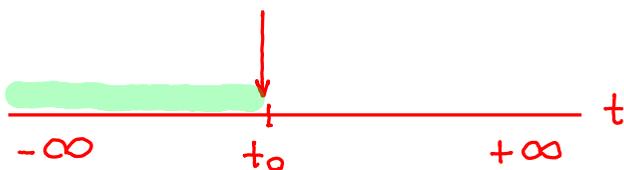
$$\mathcal{H}x(t) = \int_{-\infty}^t x(\tau) d\tau.$$

Solution. Consider the calculation of $\mathcal{H}x(t_0)$ for arbitrary t_0 . We have

$$\mathcal{H}x(t_0) = \int_{-\infty}^{t_0} x(\tau) d\tau.$$

Thus, we can see that $\mathcal{H}x(t_0)$ depends only on $x(t)$ for $-\infty < t \leq t_0$. Since all of the values in this interval are less than or equal to t_0 , the system is causal. ■

Consider computation
of output at this point



at what points must
input be known?