Example 9-20: Flip System not Causal

Consider a system defined by the input/output relation

$$y(t) = x(-t)$$

This is a time-reversal system, i.e., it "turns the signal around in time." Equation (9.69) does not apply to this case because the system is only linear, it is *not* time-invariant. Therefore we must resort to the general definition. From the input/output relation, we see that $y(-2) = x(2)$; i.e., we need a "future" value of $x(\tau)$ to compute $y(-2)$. Indeed, at any time $t_0 < 0$, we need a value of the input at a future time $-t_0$ so the system is not causal. ■