$$y[n] = \begin{cases} x[n-1], & n \geq 1 \\ 0, & n = 0 \\ x[n], & n \leq -1 \end{cases}$$

CAUSAL ✓

memory

Stable

- ~~Memoryless~~ Memory, Past value

$y[0] \rightarrow$ $y[1] = x[1-1] = x[0]$

$y[2] = x[2-1] = x[1]$

Memory

Time Invariant

Time Variant

$x_1(t) \longrightarrow S^{t_0} \xrightarrow{x_2(t) = x_1(t-t_0)} H \longrightarrow y_1(t) = x_1[n-n_0-1]$

$x_1(t) \longrightarrow H \xrightarrow{y_1(t) = x_1(t-t_0)} S^{t_0} \quad y(t-t_0) = x_1[n-n_0-1]$

Causal - Only past values ✓

$x_1(t) \rightarrow y_1(t) = x_1[n-1]$

$x_2[n] \rightarrow y_2[n] = x_2[n-1]$

$x_3[n] \rightarrow x_1[n] + x_2[n] \rightarrow y_3[n] = \underbrace{x_1[n-1]}_{y_1(t)} + \underbrace{x_2[n-1]}_{y_2(n)}$ Linear ✓

Time Variant ?

$y_1[n] = x_1[n-n_0]$

$y_1[n-n_0] = x_1[n-n_0]$ → Time - Variant

LINEAR

CAUSAL Answers

STABLE