Given 3 vectors $x_1 = [1,1,1,1]^T$, $x_2 = [0,0,0,1]^T$
$x_3 = [1,0,1,0]^T$ built HAM and test stability of x_1, x_2, x_3.

$\boxed{\text{EXAMPLE 2}}$

$x_i^j \in \{0,1\} \Rightarrow$ transform to $\{-1,1\}$ i.e.

$x_1 = [1,1,1,1]^T$, $x_2 = [-1,-1,-1,1]^T$, $x_3 = [1,-1,1,-1]^T$

Matrix T:

$$T = \frac{1}{3}\begin{bmatrix} 0 & 1 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & -1 \\ -1 & 1 & -1 & 0 \end{bmatrix}$$

ANSWER
$x_1 \rightarrow \overline{x_2}$ (not stable)
$x_2 \rightarrow x_2$ (stable)
$x_3 \rightarrow \overline{x_2}$ (not stable)

Stability of x_1

$$Tx_1 = \frac{1}{3}\begin{bmatrix} 3 \\ 3 \\ 3 \\ -1 \end{bmatrix} \Rightarrow sgn(Tx_1) = \begin{bmatrix} 1 \\ 1 \\ 1 \\ -1 \end{bmatrix} = x_1'$$

$x_1' \neq x_1 \Rightarrow$ we need to iterate again

$$Tx_1' = \frac{1}{3}\begin{bmatrix} 5 \\ 1 \\ 5 \\ -1 \end{bmatrix} \Rightarrow sgn(Tx_1') = \begin{bmatrix} 1 \\ 1 \\ 1 \\ -1 \end{bmatrix} = x_1'$$

x_1 is not stable, it converges to $\overline{x_2}$ $\left(\begin{bmatrix} 1 \\ 1 \\ 1 \\ -1 \end{bmatrix}\right)$

Stability of x_2

$$Tx_2 = \frac{1}{3}\begin{bmatrix} -5 \\ -1 \\ -5 \\ 1 \end{bmatrix} \Rightarrow sgn(Tx_2) = \begin{bmatrix} -1 \\ -1 \\ -1 \\ 1 \end{bmatrix} = x_2 \Rightarrow x_2 \text{ is stable}$$

Stability of x_3

$$Tx_3 = \frac{1}{3}\begin{bmatrix} 3 \\ 1 \\ 3 \\ -1 \end{bmatrix} \Rightarrow sgn(Tx_3) = \begin{bmatrix} 1 \\ 1 \\ 1 \\ -1 \end{bmatrix} = x_3'$$

$x_3' \neq x_3 \Rightarrow$ we need to iterate again

$$Tx_3' = \frac{1}{3}\begin{bmatrix} 3 \\ 1 \\ 5 \\ -1 \end{bmatrix} \Rightarrow sgn(Tx_3') = \begin{bmatrix} 1 \\ 1 \\ 1 \\ -1 \end{bmatrix} = \underset{\overline{x_2}}{\underset{\parallel}{x_3'}} \Rightarrow$$

x_3 is not stable, it converges to $\overline{x_2}$