

W_A

$$\begin{bmatrix} -1 \\ 1 \end{bmatrix} \begin{bmatrix} 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$$

$$W_B \begin{bmatrix} 1 \\ -1 \end{bmatrix} \begin{bmatrix} -1 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$$

$$W_{12} = (-1 \times 1) + (1 \times -1) \\ = -2$$

$$W = \begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix} \rightarrow \begin{bmatrix} 0 & -2 \\ -2 & 0 \end{bmatrix}$$

$$\begin{bmatrix} W_{11} & W_{12} \\ W_{21} & W_{22} \end{bmatrix} \quad W_{11}, W_{22} = 0 \\ W_{12} = W_{21}$$

h

$$S^1 = \begin{bmatrix} -1 & -1 & 1 \end{bmatrix}^T$$

$$S^2 = \begin{bmatrix} 1 & -1 & -1 \end{bmatrix}^T$$

$$S^3 = \begin{bmatrix} -1 & 1 & 1 \end{bmatrix}^T$$

$$w_{11} = 0$$

$$w_{12} = 1 + (-1) + (-1) = -1$$

$$w_{13} = (-1) + (1) + (-1) = -3$$

$$w_{21} = w_{12} = -1$$

$$w_{22} = 0$$

$$w_{23} = (-1) + (1) + (1) = 1$$

$$w_{31} = w_{13} = -3$$

$$w_{32} = w_{23} = 1$$

$$w_{33} = 0$$

$$W^1 = \begin{bmatrix} -1 \\ -1 \\ 1 \end{bmatrix} \begin{bmatrix} -1 & -1 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 1 & -1 \\ 1 & 1 & -1 \\ -1 & -1 & 1 \end{bmatrix}$$

$$W^2 = \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix} \begin{bmatrix} 1 & -1 & -1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & -1 \\ -1 & 1 & 1 \\ -1 & 1 & 1 \end{bmatrix}$$

$$W^3 = \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix} \begin{bmatrix} -1 & 1 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 & -1 \\ -1 & 1 & 1 \\ -1 & 1 & 1 \end{bmatrix}$$

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

$$W = W^1 + W^2 + W^3, w_{ii} = 0$$

$$\text{sgn}[Wx] \quad \begin{matrix} [1 \ 1 \ 1]^T \\ [1 \ -1 \ -1]^T \end{matrix}$$

$$\begin{bmatrix} 0 & -2 & 2 \\ -2 & 0 & -2 \\ 2 & -2 & 0 \end{bmatrix} \begin{bmatrix} -1 \\ -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & -2 & 2 \\ -2 & 0 & -2 \\ 2 & -2 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 4 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix} =$$

$$\begin{bmatrix} 0 & -2 & 2 \\ -2 & 0 & -2 \\ 2 & -2 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 4 \\ -4 \\ 4 \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$$

$$y = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$$