Janelle Morano

Assignment #1

2) $A \times b$

$$A = \begin{bmatrix} 2 & 2 \\ 5 & 3 \\ 1 & 1 \end{bmatrix} \times b = \begin{bmatrix} 5 \\ 5 \end{bmatrix} = \begin{bmatrix} 2\cdot5 + 2\cdot5 \\ 5\cdot5 + 3\cdot5 \\ 1\cdot5 + 1\cdot5 \end{bmatrix} = \begin{bmatrix} 20 \\ 40 \\ 10 \end{bmatrix}$$

3×2 $\quad$ 2×1

$X \times A$

$$x = \begin{bmatrix} 3 & 2 & 1 \end{bmatrix} \times A = \begin{bmatrix} 2 & 2 \\ 5 & 3 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 3\cdot2 + 2\cdot5 + 1\cdot1 & 3\cdot2 + 2\cdot3 + 1\cdot1 \end{bmatrix} = \begin{bmatrix} 17 & 13 \end{bmatrix}$$

1×3 $\quad$ 3×2

$A \times B$

$$A = \begin{bmatrix} 2 & 2 \\ 5 & 3 \\ 1 & 1 \end{bmatrix} \times B = \begin{bmatrix} 1 & 4 & 2 \\ 2 & 2 & 6 \end{bmatrix} = A \begin{bmatrix} 2 & 2 \\ 5 & 3 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} 2\cdot1+2\cdot2 & 2\cdot4+2\cdot2 & 2\cdot2+2\cdot6 \\ 5\cdot1+3\cdot2 & 5\cdot4+3\cdot2 & 5\cdot2+3\cdot6 \\ 1\cdot1+1\cdot2 & 1\cdot4+1\cdot2 & 2\cdot1+1\cdot6 \end{bmatrix} = \begin{bmatrix} 6 & 12 & 16 \\ 11 & 26 & 28 \\ 3 & 6 & 8 \end{bmatrix}$$

3×2 $\quad$ 2×3

b)

$$W \text{ invertible?} = \begin{bmatrix} 1.5 & 3 & 4.5 \\ 4 & 7 & 12 \\ 2.5 & 3 & 7.5 \end{bmatrix}$$

3×3

① Is W^TW square? $W^T = 3\times3$ $\quad W = 3\times3 \Rightarrow$ YES

② Are columns linearly independent? NO, because column 1 can be multiplied by 3 to get column 3

ex $\begin{bmatrix} 1.5(3) & \dots = 4.5 \\ 4(3) & \dots = 12 \\ 2.5(3) & \dots = 7.5 \end{bmatrix}$

$\therefore$ W is not invertible