

NAME:

Problem 1 (5 points):

Let $X = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$, $Y = \begin{bmatrix} 6 & 5 \\ 4 & 3 \\ 2 & 1 \end{bmatrix}$, and $Z = [3 \ 2 \ 1]$. Decide which of the following are defined, and evaluate those which are defined:

- a) ZX
- b) YZ
- c) ZY

Solution:

$$ZX = [3 \ 2 \ 1] \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix} = [3 \cdot 3 + 2 \cdot 2 + 1 \cdot 1] = [9 + 4 + 1] = [14].$$

YZ is undefined.

$$ZY = [3 \ 2 \ 1] \begin{bmatrix} 6 & 5 \\ 4 & 3 \\ 2 & 1 \end{bmatrix} = [3 \cdot 6 + 2 \cdot 4 + 1 \cdot 2 \quad 3 \cdot 5 + 2 \cdot 3 + 1 \cdot 1] = [28 \ 22].$$

Problem 2 (5 points):

Find 2×2 matrices A , B such that $A \neq \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, $B \neq \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, and $AB = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$.

Solution:

For one solution, let $A = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$.

Problem 3 (5 points):

Let $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$. What is A^{-1} ?

Solution:

Using row operations, we find that $A^{-1} = -\frac{1}{2} \begin{bmatrix} 4 & -3 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -2 & \frac{3}{2} \\ 1 & -\frac{1}{2} \end{bmatrix}$.