

① Let $A = \begin{bmatrix} -2 & 0 & 0 & 1 \\ 1 & 0 & 2 & 3 \\ -1 & 1 & 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 & 0 & 7 \\ 0 & 1 & 2 \end{bmatrix}$

Please also write your name on the back of this sheet

Find AB or BA , whichever is defined.

(5pts) $A^k B^m$ is undefined

$$BA = \begin{bmatrix} 3 & -1 & 0 \\ 0 & 1 & 2 \end{bmatrix} \begin{bmatrix} -2 & 0 & 0 & 1 \\ 1 & 0 & 2 & 3 \\ -1 & 1 & 0 & 4 \end{bmatrix} = \begin{bmatrix} -7 & 0 & -2 & 0 \\ -1 & 2 & 2 & 11 \end{bmatrix}$$

② For the following system, write the augmented matrix, get it in row echelon form or reduced row echelon form, and solve the system.

(7pts)

$$\begin{bmatrix} 2 & -4 & 0 & 4 & | & 5 \\ 0 & 0 & 2 & -2 & | & 1 \\ 1 & -2 & 1 & 1 & | & 3 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_3} \begin{bmatrix} 1 & -2 & 1 & 1 & | & 3 \\ 0 & 0 & 2 & -2 & | & 1 \\ 2 & -4 & 0 & 4 & | & 5 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 1 & 1 & | & 3 \\ 0 & 0 & 2 & -2 & | & 1 \\ 0 & 0 & -2 & 2 & | & -1 \end{bmatrix} \xrightarrow{R_2 + R_3} \begin{bmatrix} 1 & -2 & 1 & 1 & | & 3 \\ 0 & 0 & 0 & 0 & | & 0 \\ 0 & 0 & 0 & 0 & | & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 1 & 1 & | & 3 \\ 0 & 0 & 1 & -1 & | & \frac{1}{2} \\ 0 & 0 & 0 & 0 & | & 0 \end{bmatrix} \xrightarrow{-R_2 + R_1} \begin{bmatrix} 1 & -2 & 0 & 2 & | & \frac{5}{2} \\ 0 & 0 & 1 & -1 & | & \frac{1}{2} \\ 0 & 0 & 0 & 0 & | & 0 \end{bmatrix}$$

row ech. form \rightarrow reduced r.e.f.

$x_1 - 2x_2 + 2x_4 = \frac{5}{2}$ $\leftarrow x_2, x_4$ are free
 $x_3 - x_4 = \frac{1}{2}$ Let $x_2 = \alpha$ $x_4 = \beta$

$x_3 = \frac{1}{2} + x_4 = \frac{1}{2} + \beta$ $x_1 = \frac{5}{2} + 2x_2 - 2x_4$
 $x_1 = \frac{5}{2} + 2\alpha - 2\beta$

$(x_1, x_2, x_3, x_4) = \left(\frac{5}{2} + 2\alpha - 2\beta, \alpha, \frac{1}{2} + \beta, \beta \right)$, α, β real #s