Homework 1 MATH 304 Section 3

Assigned: Friday, September 5.
Potentially Collected: Friday, September 12.

1.

$$A = \begin{bmatrix} 1 & -2 & 0 & 2 \\ 2 & -3 & -1 & 5 \\ 1 & 3 & 2 & 5 \\ 1 & 1 & 0 & 2 \end{bmatrix}$$

a) Find matrices B and C, $B \neq C$, in row echelon form (REF) row equivalent to A.

b) Find a matrix D in reduced row echelon form (RREF) row equivalent to A.

2.

$$2x - y = 5 \qquad 4x - 2y = t$$

Find a value t such that the system of linear equation is

a) consistent.

b) inconsistent.

System as Matrix $\begin{bmatrix} 2 & -1 & 5 \\ 4 & -2 & t \end{bmatrix}$

$r_2 = R_2 - 2R_1$ $\begin{bmatrix} 2 & -1 & 5 \\ 0 & 0 & t-10 \end{bmatrix}$

$t = 10$ (a)

$t \neq 10$ (b)

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(1) $r_2 = R_2 - 2R_1$, $r_3 = R_3 - R_1$, $r_4 = R_4 - R_1$ $\begin{bmatrix} 1 & -2 & 0 & 2 \\ 0 & 1 & -1 & 1 \\ 0 & 5 & 2 & 3 \\ 0 & 3 & 0 & 0 \end{bmatrix}$

$r_3 = R_3 - 5R_2$, $r_4 = R_4 - 3R_3$ $\begin{bmatrix} 1 & -2 & 0 & 2 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & 7 & -2 \\ 0 & 0 & 3 & -3 \end{bmatrix}$

$r_4 = \frac{1}{3}R_4$ then $r_4 = R_3$, $r_3 = R_4$ $\begin{bmatrix} 1 & -2 & 0 & 2 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 7 & -2 \end{bmatrix}$

$r_4 = R_4 - 7R_3$ $\begin{bmatrix} 1 & -2 & 0 & 2 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 5 \end{bmatrix}$ let $= B$

$r_4 = \frac{1}{5}R_4$ $\begin{bmatrix} 1 & -2 & 0 & 2 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ let $= C$

to RREF:

$r_3 = R_3 + R_4$, $r_2 = R_2 - R_4$, $r_1 = R_1 - 2R_4$ $\begin{bmatrix} 1 & -2 & 0 & 0 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

$r_2 = R_2 + R_3$ then $r_1 = R_1 + 2R_2$ $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = D$ let