Exam 1 Question REDO

Matthew Mendoza

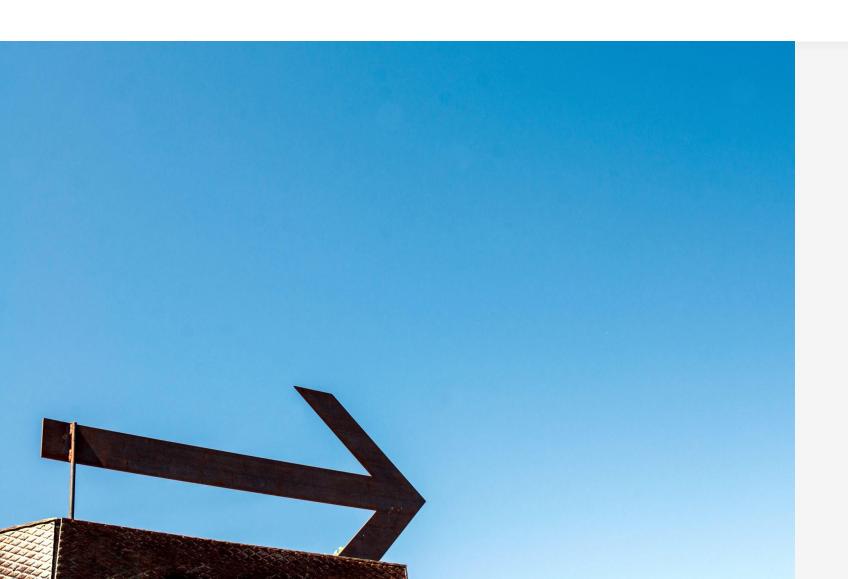
Exam 01 – February 29th, 2024

Question 3

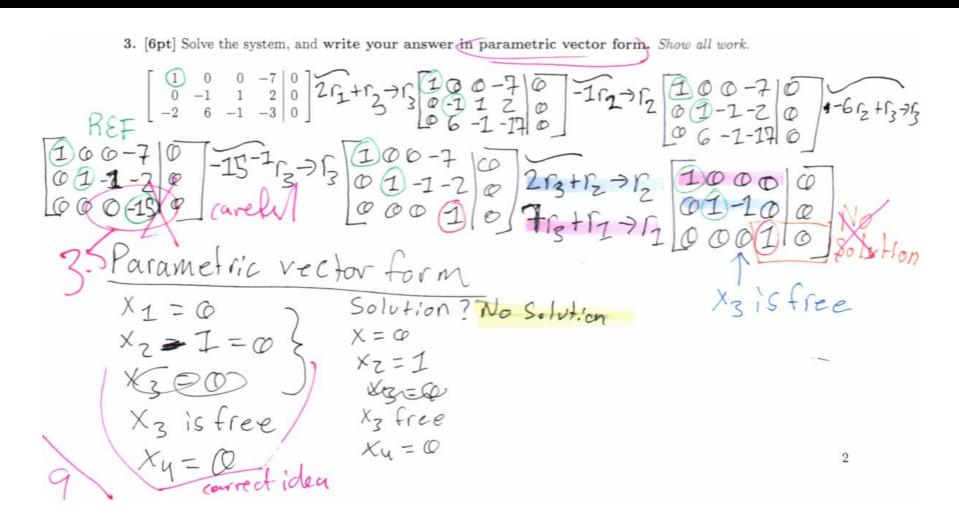
3. [6pt] Solve the system, and write your answer in parametric vector form.

$$egin{bmatrix} 1 & 0 & 0 & -7 & 0 \ 0 & -1 & 1 & 2 & 0 \ -2 & 6 & -1 & -3 & 0 \end{bmatrix}$$

How did it go?

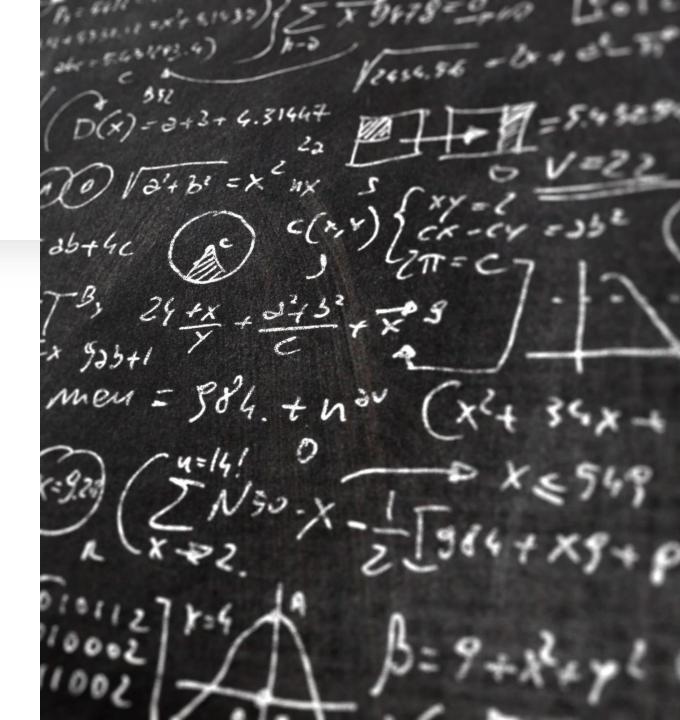


Didn't go so well...



My error?

Basic algebra



Step 1

Original

$$\begin{bmatrix} 1 & 0 & 0 & -7 & 0 \\ 0 & -1 & 1 & 2 & 0 \\ -2 & 6 & -1 & -3 & 0 \end{bmatrix} 2 f_1 + f_2 \rightarrow f_3 \begin{bmatrix} 1 & 0 & 0 & -7 & 0 \\ 2 & 1 & 2 & 0 \\ 0 & 6 & -1 & -17 & 0 \end{bmatrix}$$

Redo

Replacement: 12+C13→12

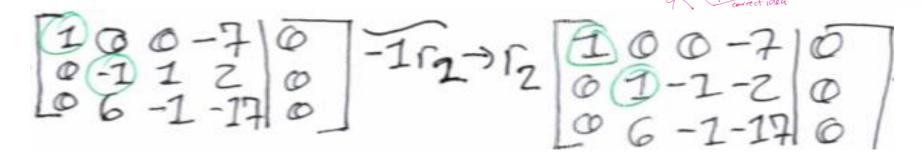
Replace a row with itself plus any multiple of another row

$$\begin{bmatrix} 1 & 0 & 0 & -7 & 0 \\ 0 & -1 & 1 & 2 & 0 \\ -2 & 6 & -1 & -3 & 0 \end{bmatrix} \xrightarrow{2 \cdot f_1 + f_3 \to f_3}$$

Solution? No Solution

Step 2

Original



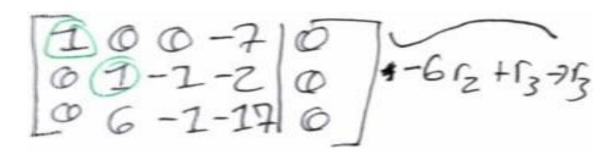
Redo

Scaling: Critical Scaling: Cri

$$\begin{bmatrix} 1 & 0 & 0 & -7 & 0 \\ 0 & -1 & 1 & 2 & 0 \\ 0 & 6 & -1 & -17 & 0 \end{bmatrix} \xrightarrow{-1r_2 \to r_2} \begin{bmatrix} 1 & 0 & 0 & -7 & 0 \\ 0 & 1 & -1 & -2 & 0 \\ 0 & 6 & -1 & -17 & 0 \end{bmatrix}$$

Step 3

Original - Algebra mistake



3. [6pt] Solve the system, and write your answer in parametric vector form. Show all work.

$$\begin{bmatrix}
0 & 0 & 0 & -7 & 0 \\
0 & -1 & 1 & 2 & 0 \\
0 & -1 & 1 & 2 & 0
\end{bmatrix}
2f_1+f_2+f_3+f_3
\begin{bmatrix}
0 & 0 & 7 & 0 \\
0 & 1 & 2 & 0 \\
0 & 6 & 1 & 7 & 0
\end{bmatrix}
2f_2+f_2+f_3+f_3
\begin{bmatrix}
0 & 0 & 7 & 0 \\
0 & 1 & 2 & 0 \\
0 & 6 & 1 & 7 & 0
\end{bmatrix}
2f_3+f_2+f_3+f_3
\begin{bmatrix}
0 & 0 & -7 & 0 \\
0 & 1 & -2 & 0 \\
0 & 6 & 1 & 7 & 0
\end{bmatrix}$$

$$\begin{bmatrix}
0 & 0 & 7 & 0 \\
0 & 1 & -2 & 0 \\
0 & 0 & 1 & 2
\end{bmatrix}$$

$$\begin{bmatrix}
0 & 0 & 7 & 0 \\
0 & 1 & -2 & 0 \\
0 & 0 & 1 & 2
\end{bmatrix}$$

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$$\begin{bmatrix}
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0 & 1 & 0 \\
0 & 1 & 0
\end{bmatrix}$$

$$\begin{bmatrix}
0 & 0 & 7 & 0 \\
0 & 1 & 0 \\
0 & 1 & 0
\end{bmatrix}$$

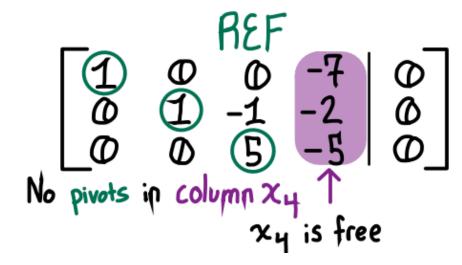
$$\begin{bmatrix}
0 &$$

Redo -
$$r_{33}$$
: $-6(-1) + (-1) = 5$

Replacement: 12+Crj→12

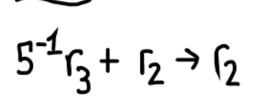
Replace a row with itself plus any multiple of another row

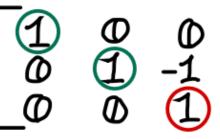
Step 4 - REDO

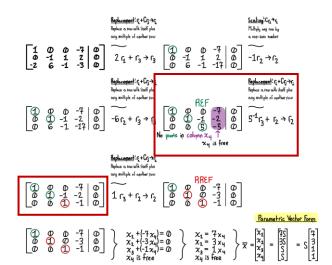


Replacement: 1; + Cr; → r.

Replace a row with itself plus any multiple of another row





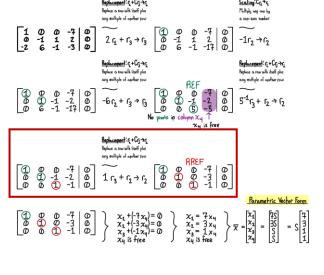


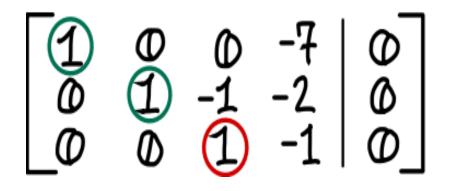
$$\begin{array}{c|cccc}
0 & 0 & -7 & 0 \\
1 & -1 & -2 & 0 \\
0 & 1 & -1 & 0
\end{array}$$

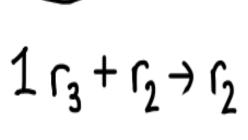
Step 4 - REDO

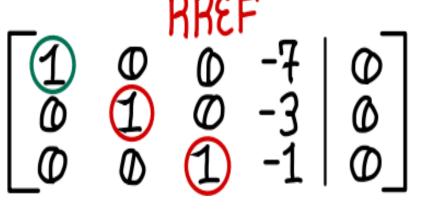
Replacement: 1; +Cr; →r;

Replace a row with itself plus any multiple of another row









Step 5 - REDO

Parametric Vector Form

$$\chi_{1} + (-7 \chi_{4}) = 0$$

 $\chi_{2} + (-3 \chi_{4}) = 0$
 $\chi_{3} + (-1 \chi_{4}) = 0$
 χ_{4} is free

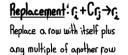
$$x_1 = 7x_4$$

 $x_2 = 3x_4$
 $x_3 = 1x_4$
 x_4 is free

Replacement: 1; + Cr; →c; Replace a row with itself plus any multiple of another row

$$\begin{bmatrix} \mathbf{1} & \mathbf{0} & \mathbf{0} & -\mathbf{7} & \mathbf{0} \\ \mathbf{0} & -\mathbf{1} & \mathbf{1} & \mathbf{2} & \mathbf{0} \\ -\mathbf{2} & \mathbf{6} & -\mathbf{1} & -\mathbf{3} & \mathbf{0} \end{bmatrix} \xrightarrow{2 \, \mathbf{f}_1 + \mathbf{f}_3 \to \mathbf{f}_3} \begin{bmatrix} \mathbf{1} & \mathbf{0} & \mathbf{0} & -\mathbf{7} & \mathbf{0} \\ \mathbf{0} & -\mathbf{1} & \mathbf{1} & \mathbf{2} & \mathbf{0} \\ \mathbf{0} & \mathbf{6} & -\mathbf{1} & -\mathbf{17} & \mathbf{0} \end{bmatrix} \xrightarrow{-\mathbf{1} \, \mathbf{f}_2 \to \mathbf{f}_2}$$

$$2 r_1 + r_3 \rightarrow r_3$$



$$\begin{bmatrix}
1 & 0 & 0 & -7 & 0 \\
0 & 1 & -1 & -2 & 0 \\
0 & 6 & -1 & -17 & 0
\end{bmatrix}
\xrightarrow{\text{any multiple of another fow}}$$

$$\begin{bmatrix}
1 & 0 & 0 & -7 & 0 \\
0 & 1 & -1 & -2 & 0 \\
0 & 0 & 0 & 0
\end{bmatrix}
\xrightarrow{\text{Any multiple of another fow}}$$

$$\begin{bmatrix}
1 & 0 & 0 & -7 & 0 \\
0 & 1 & -1 & -2 & 0 \\
0 & 0 & 0 & 0
\end{bmatrix}
\xrightarrow{\text{S}^{-1}} \cdot \cdot \cdot \cdot \cdot \cdot$$

$$\begin{bmatrix}
1 & 0 & 0 & -7 & 0 \\
0 & 0 & 0 & 0
\end{bmatrix}
\xrightarrow{\text{S}^{-1}} \cdot \cdot \cdot \cdot \cdot$$
No pivots in column $x_{++} \cdot \cdot \cdot$

Multiply any row by a non-zero number

Replacement: 1 + C1 →1

Replace a row with itself plus any multiple of another row

Replacement: 1; +C1; →1;

Replace a row with itself plus any multiple of another row

$$\begin{bmatrix} 1 & 0 & 0 & -7 & 0 \\ 0 & 1 & -1 & -2 & 0 \\ 0 & 0 & 1 & -1 & 0 \end{bmatrix} \xrightarrow{1 \ r_3 + r_2 \to r_2} \begin{bmatrix} 1 & 0 & 0 & -7 & 0 \\ 0 & 1 & 0 & -3 & 0 \\ 0 & 0 & 1 & -1 & 0 \end{bmatrix}$$

Parametric Vector Form

$$\begin{bmatrix}
1 & 0 & 0 & -7 & 0 \\
0 & 1 & 0 & -3 & 0 \\
0 & 0 & 1 & -1 & 0
\end{bmatrix}$$

$$\begin{cases}
\chi_1 + (-7\chi_1) = 0 \\
\chi_2 + (-3\chi_1) = 0 \\
\chi_3 + (-1\chi_1) = 0
\end{cases}$$

$$\chi_1 = 7\chi_1 \\
\chi_2 = 3\chi_1 \\
\chi_3 = 1\chi_1 \\
\chi_4 \text{ is free}
\end{cases}$$

$$\overline{\chi} = \begin{bmatrix} \chi_1 \\ \chi_2 \\ \chi_3 \\ \chi_1 \end{bmatrix} = \begin{bmatrix} 7S \\ 3S \\ S \\ S \end{bmatrix} = S \begin{bmatrix} 73 \\ 31 \\ 11 \end{bmatrix}$$