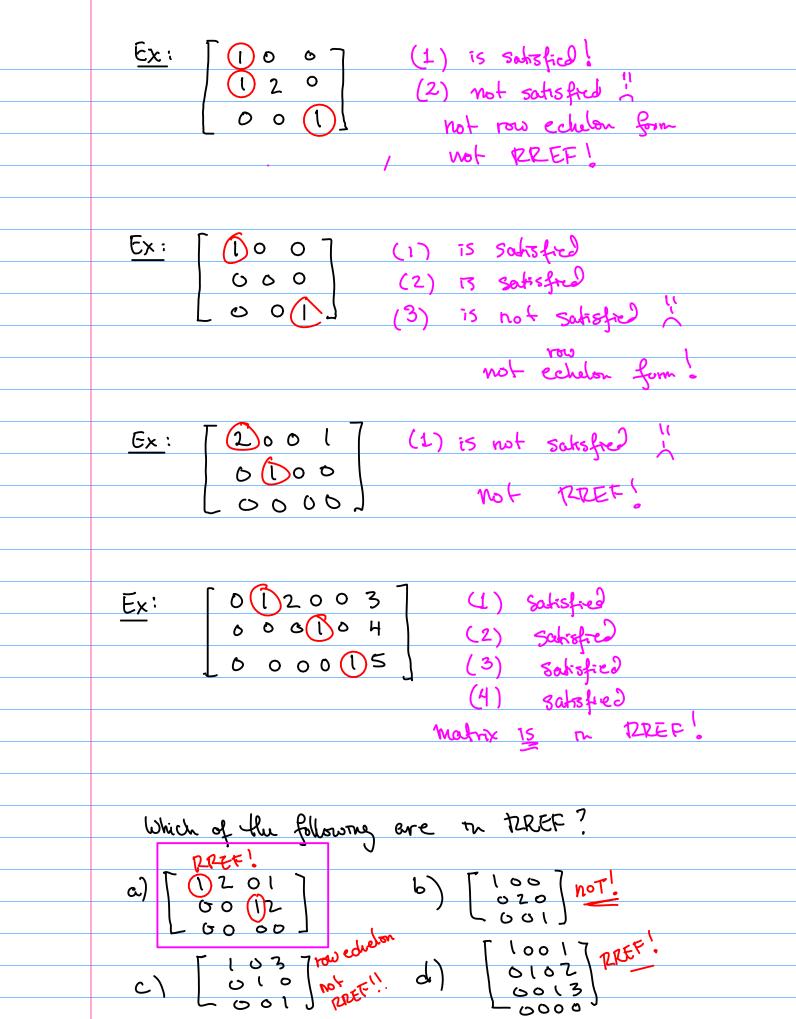
Last Time:
· linear equations
° systems of linear equations
· Story problem -> system of brear equations
_
Today is all about solving systems of equations
O mino J. I for
· RREF row-reduced echelon form 7 see both
· RREF row-reduced echelon form ? see both reduced row echelon form
Gaussian etimination
- elementary vous operations
· solving linear systems via Gaussian elimination
0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
Row-reduced echelon form (RREF)
Def: An mxn matrix is in row edulon form
if it satisfy the following properties
if it satisfies the following properties  (1) · the first nonzero entry of every row is a 1 (leading 1)  (2) · the leading 1 of any row must occur to the right  of the leading 1's of rows above
(2). The leading I of any must secure to the right
of the leading 1's of verse above
(3) carry rows of zeros are at the bottom of the metrix
If The addition we satisfy the property
(4) any column with a leading I has no other
nonzero entries
then we say the matrix to the RREF
Ex: [ D204] (1) is satisfied ?
00 (1) (2) is satisfied! from !!  (3) is satisfied!
(4) = 10 ( DDT+
(4) is satisfied! RREF



## Gaussian etrumotion

## Elementary tous operations

- · swapping two rows R; (> R;
- · multiplying a row by a nonzero constant ch;
- · adding a constant nultiple of on row to another R; + CR;

## Examples:

$$\begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix} \xrightarrow{R_1 - \frac{1}{7}R_3} \begin{bmatrix} 1 \\ 3 \\ 4 \end{bmatrix}$$

$$\begin{bmatrix} 3 \\ 4 \\ 77 \end{bmatrix}$$

## Gaussian elimination:

$$\begin{bmatrix}
-1253 \\
10-6
\end{bmatrix}
\xrightarrow{-1R}
\begin{bmatrix}
1-2-5-3 \\
10-6
\end{bmatrix}$$

$$\begin{bmatrix}
-422-2
\end{bmatrix}$$

$$R_{2}-R_{1} = \begin{bmatrix} 1 & 0 & -6 & 1 \\ -1 & -2 & -5 & -3 \\ 0 & 2 & -1 & 4 \\ -4 & 2 & 2 & -2 \end{bmatrix} \xrightarrow{R_{1}} \begin{bmatrix} 1 & -2 & -5 & -3 \\ 0 & 2 & -1 & 4 \\ -2 & 1 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -5 & -3 \\ 0 & 2 & -1 & 4 \\ -2 & 1 & -1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -5 & -3 \\ 0 & 2 & -1 & 4 \\ 0 & -3 & -9 & -7 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -5 & -3 \\ 0 & 2 & -1 & 4 \\ 0 & -3 & -9 & -7 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -5 & -3 \\ 0 & 1 & -\frac{1}{2} & 2 \\ 0 & -3 & -9 & -7 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -5 & -3 \\ 0 & 1 & -\frac{1}{2} & 2 \\ 0 & -3 & -9 & -7 \end{bmatrix}$$

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$$\begin{bmatrix} 1 & -2 & -5 & -3 \\ 0 & 1 & -\frac{1}{2} & 2 \\ 0 & 0 & -\frac{11}{2} & -1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & -\frac{11}{2} & 2 \\ 0 & 0 & -\frac{11}{2} & -1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & -\frac{11}{2} & 2 \\ 0 & 0 & \frac{12}{2} \\ 0 & 0 & \frac{12}{2} \\ 0 & 0 & \frac{12}{2} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & \frac{11}{4} \\ 0 & 1 & -\frac{1}{2} & 2 \\ 0 & 0 & 1 & \frac{11}{2} \\ 0 & 0 & \frac{12}{2} \end{bmatrix}$$

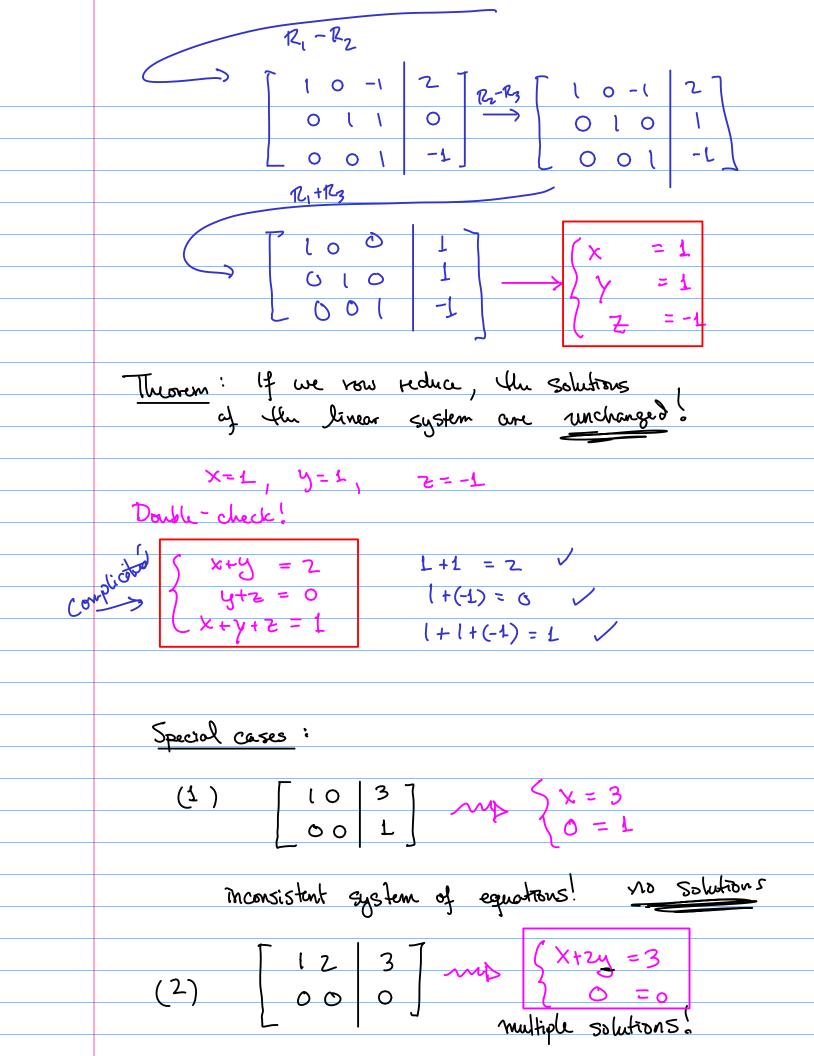
$$\begin{bmatrix} 1 & 0 & 0 & \frac{11}{4} \\ 0 & 1 & 0 & \frac{11}{4} \\ 0 & 0 & 1 & \frac{11}{4} \end{bmatrix}$$

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$$\begin{bmatrix} 1 & 0 & 0 & \frac{11}{4} \\ 0 & 1 & \frac{11}{4} \\ 0 & 0 & \frac{11}{4} \end{bmatrix}$$



y=0 / x+2(0)=3 extra flexibility