

## Section 2.1 : cont'd

Thursday, September 20, 2018 12:59 PM

last time, we looked at the system

$$\begin{cases} x + 2y = 8 \\ 3x - 4y = -6 \end{cases}$$

augmented matrix of the same system:

$$\left[ \begin{array}{cc|c} 1 & 2 & 8 \\ 3 & -4 & -6 \end{array} \right]$$

- a matrix made up of the coefficients of the variables

- instead of doing elementary operations on equations, we do operations on the rows of the matrix

elementary row operations:

- ① swap row  $i$  with row  $j$   $R_i \leftrightarrow R_j$
- ② multiply row  $i$  by a non-zero constant  $cR_i$
- ③ replace row  $i$  by itself plus a constant  $c$  times row  $j$   $R_i + cR_j$

example: 
$$\begin{cases} x + 2y = 8 \\ 3x - 4y = -6 \end{cases}$$

$$\left[ \begin{array}{cc|c} 1 & 2 & 8 \\ 3 & -4 & -6 \end{array} \right] \xrightarrow{R_2 - 3R_1} \left[ \begin{array}{cc|c} 1 & 2 & 8 \\ 0 & -10 & -30 \end{array} \right]$$

$$\begin{bmatrix} 1 & 2 & | & 8 \\ 3 & -4 & | & -6 \end{bmatrix} \xrightarrow{R_2 - 3R_1} \begin{bmatrix} 1 & 2 & | & 8 \\ 0 & -10 & | & -30 \end{bmatrix}$$

$$\downarrow$$

$$-\frac{1}{10}R_2 \begin{bmatrix} 1 & 2 & | & 8 \\ 0 & 1 & | & 3 \end{bmatrix}$$

$$\downarrow$$

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

solution to system is  $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$

terminology :

