

Unit 1 Day 3 Notes

Solving Matrix Equations

Review:

$$3 = 10x - 7$$

$$+7$$

$$\frac{1}{10} \cdot \frac{10}{10} = \frac{10}{10} \cdot \frac{10}{10}$$

$$1 = x$$

$$-2 = \frac{1}{3}x - 8$$

$$+8$$

$$\frac{3}{1} \cdot \frac{1}{3} \cdot 6 = \frac{1}{3}x \cdot \frac{3}{1} \cdot 3$$

$$18 = x$$

Example:

①

$$\begin{bmatrix} 10 \\ 4 \\ 3 \end{bmatrix} = y - \begin{bmatrix} 7 \\ -5 \\ -11 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 17 \\ -1 \\ -8 \end{bmatrix} = y$$

$$+ \begin{bmatrix} 7 \\ -5 \\ -11 \end{bmatrix}$$

$$+ \begin{bmatrix} 7 \\ -5 \\ -11 \end{bmatrix}$$

②

$$\frac{1}{2} \cdot 2x = \begin{bmatrix} 4 \\ 6 \\ -20 \end{bmatrix} \cdot \frac{1}{2} \rightarrow x = \begin{bmatrix} 2 \\ 3 \\ -10 \end{bmatrix}$$

Determinants

• must have a square matrix
(i.e. same # of rows as columns)

2x2 matrix

$$|A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

Example:

$$\begin{bmatrix} 8 & 15 \\ 7 & -3 \end{bmatrix} = A \quad |A| = 8(-3) - 15(7) \\ = -24 - 105 \\ = -129$$

3x3 matrix

Example:

$$A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & -2 & -1 \\ -5 & 2 & 6 \end{bmatrix} \quad \begin{bmatrix} + & - & + \\ - & + & - \\ + & - & + \end{bmatrix}$$

$$|A| = +2 \begin{vmatrix} -2 & -1 \\ 2 & 6 \end{vmatrix} - 1 \begin{vmatrix} 4 & -1 \\ -5 & 6 \end{vmatrix} + 3 \begin{vmatrix} 4 & -2 \\ -5 & 2 \end{vmatrix} \\ = 2(-12 - (-2)) - 1(24 - 5) + 3(8 - 10) \\ = 2(-10) - 1(19) + 3(-2) \\ = -20 - 19 - 6 = -45$$