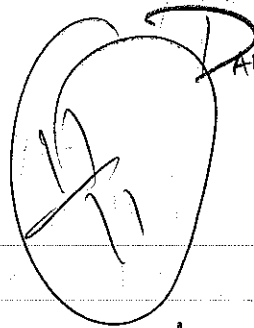


HW #6



ANEEL
HENAO

3.4 3, 8, 10, 31, 32

3) $CA + dB$

$$-2 \begin{pmatrix} 5 & 0 \\ 0 & 7 \\ 3 & -1 \end{pmatrix} = \begin{pmatrix} -10 & 0 \\ 0 & -14 \\ -6 & 2 \end{pmatrix}$$

$$4 \begin{pmatrix} -4 & 5 \\ 3 & 2 \\ 7 & 4 \end{pmatrix} = \begin{pmatrix} -16 & 20 \\ 12 & 8 \\ 28 & 16 \end{pmatrix}$$

$$CA + dB = \begin{pmatrix} -26 & 20 \\ 12 & -6 \\ 22 & 18 \end{pmatrix}$$

8) $AB = \begin{pmatrix} 1 & 0 & 3 \\ 2 & -5 & 4 \end{pmatrix} \begin{pmatrix} 3 & 0 \\ -1 & 4 \\ 6 & 5 \end{pmatrix} = \begin{matrix} 3+0+18 & 0+0+15 \\ 6+5+24 & 0+20+20 \end{matrix}$

$$= \begin{pmatrix} 21 & 15 \\ 35 & 0 \end{pmatrix}$$

$BA = \begin{pmatrix} 3 & 0 \\ -1 & 4 \\ 6 & 5 \end{pmatrix} \begin{pmatrix} 1 & 0 & 3 \\ 2 & -5 & 4 \end{pmatrix} = \begin{pmatrix} 3+0 & 0+0 & 9+0 \\ -1+8 & 0+20 & 0+16 \\ 6+10 & 0+25 & 18+20 \end{pmatrix}$

$$= \begin{pmatrix} 3 & 0 & 9 \\ 7 & 20 & 16 \\ 16 & 25 & 38 \end{pmatrix}$$

10) $BA = \text{UNDEFINED}$
 WZ 2×3 2×2
 DON'T MATCH

$AB = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix} \begin{pmatrix} -1 & 0 & 4 \\ 3 & -2 & 5 \end{pmatrix} = \begin{pmatrix} -2+3 & 0+2 & 8+5 \\ -4+9 & 0+6 & 16+15 \end{pmatrix}$

$$= \begin{pmatrix} 1 & 2 & 13 \\ 5 & 6 & 31 \end{pmatrix}$$

$$\textcircled{31} \quad A = \begin{pmatrix} 2 & -1 \\ -4 & 3 \end{pmatrix} \quad \frac{1}{3} B = \begin{pmatrix} 1 & 5 \\ 3 & 7 \end{pmatrix}$$

$$a. \quad |A+B| = \begin{vmatrix} 2 & -1 \\ -4 & 3 \end{vmatrix} + \begin{vmatrix} 1 & 5 \\ 3 & 7 \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ -1 & 10 \end{vmatrix}$$

$$\frac{1}{3} |A-B| = \begin{vmatrix} 1 & -6 \\ -7 & -4 \end{vmatrix} \quad \text{so... } |A+B|/|A-B| = \begin{vmatrix} 3 & 4 \\ -1 & 10 \end{vmatrix} \begin{vmatrix} 1 & -6 \\ -7 & -4 \end{vmatrix}$$

$$= \begin{vmatrix} 3+28 & -18+16 \\ -1+-70 & 6+-40 \end{vmatrix}$$

$$= \begin{vmatrix} -25 & -34 \\ -71 & -34 \end{vmatrix}$$

$$\frac{1}{1} A^2 = \begin{vmatrix} 2 & -1 \\ -4 & 3 \end{vmatrix} \begin{vmatrix} 2 & -1 \\ -4 & 3 \end{vmatrix} = \begin{vmatrix} 4+4 & -2+-3 \\ -8+-12 & 4+9 \end{vmatrix} = \begin{vmatrix} 8 & -5 \\ -20 & 13 \end{vmatrix}$$

$$B^2 = \begin{vmatrix} 1 & 5 \\ 3 & 7 \end{vmatrix} \begin{vmatrix} 1 & 5 \\ 3 & 7 \end{vmatrix} = \begin{vmatrix} 1+15 & 5+35 \\ 3+21 & 15+49 \end{vmatrix} = \begin{vmatrix} 16 & 40 \\ 24 & 64 \end{vmatrix}$$

$$A^2 - B^2 = \begin{vmatrix} 8 & -5 \\ -20 & 13 \end{vmatrix} \begin{vmatrix} 16 & 40 \\ 24 & 64 \end{vmatrix} = \begin{vmatrix} -8 & -45 \\ -44 & -51 \end{vmatrix}$$

$$A^2 - B^2 \neq |A+B|/|A-B|$$

$$b. \quad \text{IF } AB=BA$$

$$|A+B|/|A-B| = A^2 + AB - BA - B^2$$

$$= A^2 - B^2 = |A+B|/|A-B|$$

$$\textcircled{32} \quad a. \quad A+B = \begin{vmatrix} 3 & 4 \\ -1 & 10 \end{vmatrix} \Rightarrow \text{FROM BEFORE}$$

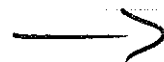
$$(A+B)^2 = \begin{vmatrix} 3 & 4 \\ -1 & 10 \end{vmatrix} \begin{vmatrix} 3 & 4 \\ -1 & 10 \end{vmatrix} = \begin{vmatrix} 9+-4 & 12+40 \\ -3+-10 & -4+100 \end{vmatrix}$$

$$= \begin{vmatrix} 5 & 52 \\ -13 & 96 \end{vmatrix}$$

$$AB = \begin{vmatrix} 2 & -1 \\ -4 & 3 \end{vmatrix} \begin{vmatrix} 1 & 5 \\ 3 & 7 \end{vmatrix} = \begin{vmatrix} 2+-3 & 10-7 \\ -4+9 & -20+21 \end{vmatrix}$$

$$= \begin{vmatrix} -1 & 3 \\ 5 & 1 \end{vmatrix}$$

$$ZAB = \begin{vmatrix} -2 & 6 \\ 10 & 2 \end{vmatrix}$$



32 a (cont)

$$A^2 = \begin{pmatrix} 4 & -5 \\ -20 & 13 \end{pmatrix} \quad \frac{1}{3} B^2 = \begin{pmatrix} 16 & 40 \\ 24 & 64 \end{pmatrix} \Rightarrow \text{FROM 31}$$

$$\text{SO... } A^2 + 2AB = \begin{pmatrix} 8 & -5 \\ -20 & 13 \end{pmatrix} + \begin{pmatrix} -2 & 4 \\ -10 & 2 \end{pmatrix} = \begin{pmatrix} 6 & 1 \\ -10 & 15 \end{pmatrix}$$

$$A^2 + 2AB + B^2 = \begin{pmatrix} 6 & 1 \\ -10 & 15 \end{pmatrix} + \begin{pmatrix} 16 & 40 \\ 24 & 64 \end{pmatrix} = \begin{pmatrix} 22 & 41 \\ 14 & 79 \end{pmatrix}$$

$$(A+B)^2 \neq A^2 + 2AB + B^2$$

b. IF $AB=BA$

$$\text{THEN } (A+B)(A+B) = A^2 + AB + BA + B^2 \\ = A^2 + 2AB + B^2$$

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6, 8, 14, 18, 30, 36

$$(6) \quad A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \text{ THEN } A^{-1} = \frac{1}{ad-bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

$$* \quad x = A^{-1}b$$

$$A = \begin{pmatrix} 4 & 7 \\ 3 & 6 \end{pmatrix} \text{ SO } A^{-1} = \frac{1}{24-21} \begin{pmatrix} 6 & -7 \\ -3 & 4 \end{pmatrix}$$

$$= \frac{1}{3} \begin{pmatrix} 6 & -7 \\ -3 & 4 \end{pmatrix} = \begin{pmatrix} 2 & -7/3 \\ -1 & 4/3 \end{pmatrix}$$

$$x = \begin{pmatrix} 2 & -7/3 \\ -1 & 4/3 \end{pmatrix} \begin{pmatrix} 10 \\ 5 \end{pmatrix} = \begin{pmatrix} 20 + -35/3 \\ -10 + 20/3 \end{pmatrix} = \begin{pmatrix} -25/3 \\ -10/3 \end{pmatrix}$$

$$(8) \quad A = \begin{pmatrix} 8 & 15 \\ 5 & 10 \end{pmatrix} \quad b = \begin{pmatrix} 7 \\ 3 \end{pmatrix} \text{ SO } A^{-1} = \frac{1}{80-75} \begin{pmatrix} 10 & -15 \\ -5 & 8 \end{pmatrix}$$

$$x = A^{-1}b = \begin{pmatrix} 2 & -3 \\ -1 & 8/5 \end{pmatrix} \begin{pmatrix} 7 \\ 3 \end{pmatrix} = \begin{pmatrix} 2 & -3 \\ -1 & 8/5 \end{pmatrix}$$

$$= \begin{pmatrix} 14 + -9 \\ -7 + 24/5 \end{pmatrix} = \begin{pmatrix} 5 \\ -11/5 \end{pmatrix}$$

$$\textcircled{14.} \begin{pmatrix} 3 & 5 & 6 & 1 & 0 & 0 \\ 2 & 4 & 3 & 0 & 1 & 0 \\ 2 & 3 & 5 & 0 & 0 & 1 \end{pmatrix} \xrightarrow{-R_3 + R_1} \begin{pmatrix} 1 & 2 & 1 & 1 & 0 & -1 \\ 2 & 4 & 3 & 0 & 1 & 0 \\ 2 & 3 & 5 & 0 & 0 & 1 \end{pmatrix} \xrightarrow{-R_3 + R_2} \begin{pmatrix} 1 & 2 & 1 & 1 & 0 & -1 \\ 0 & 1 & -2 & 0 & 1 & -1 \\ 2 & 3 & 5 & 0 & 0 & 1 \end{pmatrix}$$

$$\xrightarrow{-2R_1 + R_3} \begin{pmatrix} 1 & 2 & 1 & 1 & 0 & -1 \\ 0 & 1 & -2 & 0 & 1 & -1 \\ 0 & -1 & 3 & -2 & 0 & 3 \end{pmatrix} \xrightarrow{R_2 + R_3} \begin{pmatrix} 1 & 2 & 1 & 1 & 0 & -1 \\ 0 & 1 & -2 & 0 & 1 & -1 \\ 0 & 0 & 1 & -2 & 1 & 2 \end{pmatrix}$$

$$\xrightarrow{-2R_2 + R_1} \begin{pmatrix} 1 & 0 & 5 & 1 & -2 & 1 \\ 0 & 1 & -2 & 0 & 1 & -1 \\ 0 & 0 & 1 & -2 & 1 & 2 \end{pmatrix} \xrightarrow{2R_3 + R_2} \begin{pmatrix} 1 & 0 & 5 & 1 & -2 & 1 \\ 0 & 1 & 0 & -4 & 3 & 3 \\ 0 & 0 & 1 & -2 & 1 & 2 \end{pmatrix}$$

$$\xrightarrow{-5R_3 + R_1} \begin{pmatrix} 1 & 0 & 0 & 11 & -7 & -9 \\ 0 & 1 & 0 & -4 & 3 & 3 \\ 0 & 0 & 1 & -2 & 1 & 2 \end{pmatrix} \quad A^{-1} = \begin{pmatrix} 11 & -7 & -9 \\ -4 & 3 & 3 \\ -2 & 1 & 2 \end{pmatrix}$$

$$\textcircled{18.} \begin{pmatrix} 1 & -2 & 2 & 1 & 0 & 0 \\ 3 & 0 & 1 & 0 & 1 & 0 \\ 1 & -1 & 2 & 0 & 0 & 1 \end{pmatrix} \xrightarrow{-R_1 + R_3} \begin{pmatrix} 1 & -2 & 2 & 1 & 0 & 0 \\ 3 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & -1 & 0 & 1 \end{pmatrix}$$

$$\text{SWITCH } R_2 \leftrightarrow R_3 \begin{pmatrix} 1 & -2 & 2 & 1 & 0 & 0 \\ 0 & 1 & 0 & -1 & 0 & 1 \\ 3 & 0 & 1 & 0 & 1 & 0 \end{pmatrix} \xrightarrow{-3R_1 + R_3} \begin{pmatrix} 1 & -2 & 2 & 1 & 0 & 0 \\ 0 & 1 & 0 & -1 & 0 & 1 \\ 0 & 6 & -5 & -3 & 1 & 0 \end{pmatrix}$$

$$\xrightarrow{2R_2 + R_1} \begin{pmatrix} 1 & 0 & 2 & -1 & 0 & 2 \\ 0 & 1 & 0 & -1 & 0 & 1 \\ 0 & 6 & -5 & -3 & 1 & 0 \end{pmatrix} \xrightarrow{-6R_2 + R_3} \begin{pmatrix} 1 & 0 & 2 & -1 & 0 & 2 \\ 0 & 1 & 0 & -1 & 0 & 1 \\ 0 & 0 & -5 & 3 & 1 & -6 \end{pmatrix}$$

$$\xrightarrow{\frac{R_3}{-5}} \begin{pmatrix} 1 & 0 & 2 & -1 & 0 & 2 \\ 0 & 1 & 0 & -1 & 0 & 1 \\ 0 & 0 & 1 & -3/5 & 1/5 & 6/5 \end{pmatrix} \xrightarrow{-2R_3 + R_1} \begin{pmatrix} 1 & 0 & 0 & 1/5 & 2/5 & 2/5 \\ 0 & 1 & 0 & -1 & 0 & 1 \\ 0 & 0 & 1 & -3/5 & 1/5 & 6/5 \end{pmatrix}$$

$$A^{-1} = \begin{pmatrix} 1/5 & 2/5 & 2/5 \\ -1 & 0 & 1 \\ -3/5 & -1/5 & 4/5 \end{pmatrix}$$

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SUPPOSE

$$A = \begin{pmatrix} 7 & 10 \\ 5 & 7 \end{pmatrix} \quad B = \begin{pmatrix} 6 & 7 \\ 5 & 6 \end{pmatrix} \quad C = \begin{pmatrix} 3 & 2 \\ 4 & 3 \end{pmatrix}$$

$$A^{-1} = \begin{pmatrix} -7 & 10 \\ 5 & -7 \end{pmatrix} \quad B^{-1} = \begin{pmatrix} 6 & -7 \\ -5 & 6 \end{pmatrix} \quad C^{-1} = \begin{pmatrix} 3 & -2 \\ -4 & 3 \end{pmatrix}$$

$$AB = \begin{pmatrix} 7 & 10 \\ 5 & 7 \end{pmatrix} \begin{pmatrix} 6 & 7 \\ 5 & 6 \end{pmatrix} = \begin{pmatrix} 42+50 & 49+60 \\ 30+35 & 35+42 \end{pmatrix} = \begin{pmatrix} 92 & 109 \\ 65 & 77 \end{pmatrix}$$

$$ABC = \begin{pmatrix} 92 & 109 \\ 65 & 77 \end{pmatrix} \begin{pmatrix} 3 & 2 \\ 4 & 3 \end{pmatrix} = \begin{pmatrix} 276+436 & 184+327 \\ 195+308 & 130+231 \end{pmatrix}$$

$$(ABC)^{-1} = \frac{1}{511-1308} \begin{pmatrix} 276 & 436 \\ 195 & 308 \end{pmatrix} = \begin{pmatrix} 712 & 511 \\ 503 & -361 \end{pmatrix} = \begin{pmatrix} -361 & 511 \\ 503 & -712 \end{pmatrix}$$

$$C^{-1}B^{-1} = \begin{pmatrix} 3 & -2 \\ -4 & 3 \end{pmatrix} \begin{pmatrix} 6 & -7 \\ -5 & 6 \end{pmatrix} = \begin{pmatrix} 18+10 & -21+-12 \\ -24+-15 & 28+18 \end{pmatrix}$$

$$C^{-1}B^{-1}A^{-1} = \begin{pmatrix} 28 & -33 \\ -39 & 46 \end{pmatrix} \begin{pmatrix} -7 & 10 \\ 5 & -7 \end{pmatrix} = \begin{pmatrix} -196+165 & 280-231 \\ 273-230 & -390+322 \end{pmatrix}$$

SO $(ABC)^{-1} = C^{-1}B^{-1}A^{-1} = \begin{pmatrix} -361 & 511 \\ 503 & -712 \end{pmatrix}$

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IF $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ THEN $A^{-1} = \frac{1}{ad-bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

AND IF $ad-bc=0$ THEN

$$A^{-1} = \frac{1}{0} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix} \quad \text{CAN'T DO!}$$