MAC1140 SEC24 HW 11-07-2007 10.5

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Due: 11-14-2007

Full Name: Fei Hua Sec#: Extra Credit Attempted?

1.

[10.5.1aPT]Find $AB - \frac{1}{2}C$ if

$$A = \begin{pmatrix} -2 & -3 & -1 \\ -1 & 0 & -5 \end{pmatrix} B = \begin{pmatrix} 1 & -2 \\ -3 & 0 \\ -1 & 3 \end{pmatrix} C = \begin{pmatrix} 0 & -8 \\ 2 & -4 \end{pmatrix}$$

Row's are from A
Column's are from B

$$(-2\ -3\ -1)\begin{pmatrix} 1 \\ -3 \\ -1 \end{pmatrix} = -2\cdot 1 + (-3)(-3) + (-1)\cdot(-1) = -2+10 = 8$$

● $\begin{pmatrix} 8 & 5 \\ 3 & -11 \end{pmatrix}$

○ $\begin{pmatrix} 8 & 8 \\ 0 & -11 \end{pmatrix}$

○ $\begin{pmatrix} 8 & 0 \\ 0 & -15 \end{pmatrix}$

○ $\begin{pmatrix} 8 & -3 \\ 3 & -15 \end{pmatrix}$

$$AB = \begin{pmatrix} -2 & -3 & -1 \\ -1 & 0 & -5 \end{pmatrix}_{2\times3} \begin{pmatrix} +1 & -2 \\ -3 & 0 \\ -1 & 3 \end{pmatrix}_{3\times2} = \begin{pmatrix} R_1C_1 & R_1C_2 \\ R_2C_1 & R_2C_2 \end{pmatrix}_{2\times2.} = \begin{pmatrix} 8 & 1 \\ 4 & -13 \end{pmatrix}$$

$$\frac{1}{2}C = \frac{1}{2}\begin{pmatrix} 0 & -8 \\ 2 & -4 \end{pmatrix} = \begin{pmatrix} 0 & -4 \\ 1 & -2 \end{pmatrix}$$

$$AB - \frac{1}{2}C = \begin{pmatrix} 8 & 1 \\ 4 & -13 \end{pmatrix} - \begin{pmatrix} 0 & -4 \\ 1 & -2 \end{pmatrix} = \begin{pmatrix} 8 & 5 \\ 3 & -11 \end{pmatrix}$$

2.

[10.5.1bPT]Find the matrix product ABC if

$$A = \begin{pmatrix} 1 & 0 & 1 \\ -1 & 1 & 1 \end{pmatrix} B = \begin{pmatrix} 1 & -1 \\ -1 & -1 \\ 1 & -1 \end{pmatrix} C = \begin{pmatrix} 1 & -2 \\ 2 & 1 \end{pmatrix}$$

R's from A
C's from B.

○ $\begin{pmatrix} 1 & -2 \\ -8 & 1 \end{pmatrix}$

○ $\begin{pmatrix} -3 & -4 \\ 0 & 5 \end{pmatrix}$

○ $\begin{pmatrix} -2 & -6 \\ -3 & 1 \end{pmatrix}$

○ $\begin{pmatrix} -4 & -2 \\ -5 & 5 \end{pmatrix}$

$$AB = \begin{pmatrix} 1 & 0 & 1 \\ -1 & 1 & 1 \end{pmatrix}_{2\times3} \begin{pmatrix} 1 & -1 \\ -1 & -1 \\ 1 & -1 \end{pmatrix}_{3\times2} = \begin{pmatrix} R_1C_1 & R_1C_2 \\ R_2C_1 & R_2C_2 \end{pmatrix}_{2\times2.} = \begin{pmatrix} 2 & -2 \\ -1 & -1 \end{pmatrix}$$

R's from (AB)
C's from C.

$$(AB)\cdot C = \begin{pmatrix} 2 & -2 \\ -1 & -1 \end{pmatrix}_{2\times2} \begin{pmatrix} 1 & -2 \\ 2 & 1 \end{pmatrix}_{2\times2} = \begin{pmatrix} R_1C_1 & R_1C_2 \\ R_2C_1 & R_2C_2 \end{pmatrix}_{2\times2.}$$

$$= \begin{pmatrix} -2 & -6 \\ -3 & 1 \end{pmatrix}$$

3.

[10.5.2c1PT]Select the entry in the first row and first column of the inverse matrix for

Drive $(A|I)$ to REF.

$A = \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$

$(A|I)_{2\times 4} = \left(\begin{array}{cc|cc} 2 & 1 & 1 & 0 \\ 1 & 1 & 0 & 1 \end{array}\right) \Rightarrow \left(\begin{array}{cc|cc} 1 & 0 & 1 & -1 \\ 1 & 1 & 0 & 1 \end{array}\right)$ R_1-R_2.

$\Rightarrow \left(\begin{array}{cc|cc} ① & \boxed{0} & 1 & -1 \\ 0 & ① & 0 & 2 \end{array}\right)$ R_2-R_1

$\uparrow$

A^{-1}

○ 3

● 1

○ -1

○ -2

○ None of these

4.

[10.5.2dPT]Find y in the solution of the system

$$\begin{cases} a_1x + b_1y = 1 \\ a_2x + b_2y = -\frac{2}{3} \end{cases}$$

A $\Downarrow$ A^{-1} $\Downarrow$

if the inverse of the matrix $\begin{bmatrix} a_1 & b_1 \\ a_2 & b_2 \end{bmatrix}$ is $\begin{bmatrix} -\frac{1}{3} & -1 \\ -\frac{1}{2} & -3 \end{bmatrix}$

● $\frac{3}{2}$

○ 0

○ 1

○ $\frac{1}{3}$

The original system is equivalent to $A\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ -\frac{2}{3} \end{pmatrix}$.

Left Multiply both sides by A^{-1}, we have.

$A^{-1}A\begin{pmatrix} x \\ y \end{pmatrix} = A^{-1}\begin{pmatrix} 1 \\ -\frac{2}{3} \end{pmatrix}$

So $\begin{pmatrix} x \\ y \end{pmatrix} = A^{-1}\begin{pmatrix} 1 \\ -\frac{2}{3} \end{pmatrix} = \begin{pmatrix} -\frac{1}{3} & -1 \\ -\frac{1}{2} & -3 \end{pmatrix}\begin{pmatrix} 1 \\ -\frac{2}{3} \end{pmatrix} = \begin{pmatrix} \frac{1}{3} \\ \frac{3}{2} \end{pmatrix}$