Math 111 F10N01 - Quiz 3 Name: SOLUTIONS.
Oct 15 2010 Stu#:

(1) [5] Let

$$\mathbf{A} = \begin{bmatrix} 1 & -2 & 0 \\ 5 & 1 & 2 \end{bmatrix}, \quad \mathbf{B} = \begin{bmatrix} 2 & -3 & 4 \\ 0 & 2 & 1 \end{bmatrix}, \quad \mathbf{C} = \begin{bmatrix} -3 & 0 & 5 \\ 2 & 1 & 3 \end{bmatrix}$$

Compute $\mathbf{3A} + 4(\mathbf{B} + \mathbf{C})$.

$$3\begin{bmatrix} 1 & -2 & 0 \\ 5 & 1 & 2 \end{bmatrix} + 4\left(\begin{bmatrix} 2 & -3 & 4 \\ 0 & 2 & 1 \end{bmatrix} + \begin{bmatrix} -3 & 0 & 5 \\ 2 & 1 & 3 \end{bmatrix}\right)$$

$$= \begin{bmatrix} 3 & -6 & 0 \\ 15 & 3 & 6 \end{bmatrix} + 4\begin{bmatrix} -1 & -3 & 9 \\ 2 & 3 & 4 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & -6 & 0 \\ 15 & 3 & 6 \end{bmatrix} + \begin{bmatrix} -4 & -12 & 36 \\ 8 & 12 & 16 \end{bmatrix}$$

$$= \begin{bmatrix} -1 & -18 & 36 \\ 23 & 15 & 22 \end{bmatrix}$$

(2) [5] Compute the following product:

$$\begin{bmatrix} 1 & -1 & 6 \\ 2 & 0 & -1 \\ 3 & 1 & 2 \end{bmatrix} \begin{bmatrix} 3 & 2 \\ 0 & 1 \\ 1 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 9 & 1 \\ 5 & 4 \\ 11 & 7 \end{bmatrix}$$

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(3) [5] Let $\mathbf{A} = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$. Determine $\mathbf{A}^{-1}$.

$$\left[\begin{array}{cc|cc} 3 & 7 & 1 & 0 \\ 2 & 5 & 0 & 1 \end{array}\right]$$

$r_1 \leftrightarrow r_2$: $\left[\begin{array}{cc|cc} 2 & 5 & 0 & 1 \\ 3 & 7 & 1 & 0 \end{array}\right]$

$R_1 = \frac{1}{2} r_1$: $\left[\begin{array}{cc|cc} 1 & \frac{5}{2} & 0 & \frac{1}{2} \\ 3 & 7 & 1 & 0 \end{array}\right]$

$R_2 = -3r_1 + r_2$: $\left[\begin{array}{cc|cc} 1 & 5/2 & 0 & 1/2 \\ 0 & -1/2 & 1 & -3/2 \end{array}\right]$

$R_2 = -2r_2$: $\left[\begin{array}{cc|cc} 1 & 5/2 & 0 & 1/2 \\ 0 & 1 & -2 & 3 \end{array}\right]$

$R_1 = (-\frac{5}{2}) r_2 + r_1$: $\left[\begin{array}{cc|cc} 1 & 0 & 5 & -7 \\ 0 & 1 & -2 & 3 \end{array}\right]$

$\therefore A^{-1} = \begin{bmatrix} 5 & -7 \\ -2 & 3 \end{bmatrix}$.