

Name: Solutions
 Student ID #: _____

Mini-Quiz # 1
 MAT-022A-Summer Session II (8/5/09)

You have 5 minutes. You may only use a pencil (or pen) and scrap paper. No calculators, notes or books.

1. Let

$$A = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix}, C = \begin{bmatrix} 1 & 2 \\ 3 & -2 \\ 0 & 1 \end{bmatrix}, u = \begin{bmatrix} 1 \\ 0 \\ -1 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 0 \\ -1 \\ 4 \\ 0 \end{bmatrix}, w = \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix}$$

Now calculate the following or, if undefined say so (1 point each).

(a) $3u - 2v = 3 \begin{bmatrix} 1 \\ 0 \\ -1 \\ 1 \end{bmatrix} + -2 \begin{bmatrix} 0 \\ -1 \\ 4 \\ 0 \end{bmatrix} = \begin{bmatrix} 3+0 \\ 0+2 \\ -3-8 \\ 3+0 \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \\ -11 \\ 3 \end{bmatrix}$

(b) $u \cdot v = \begin{bmatrix} 1 \\ 0 \\ -1 \\ 1 \end{bmatrix} \cdot \begin{bmatrix} 0 \\ -1 \\ 4 \\ 0 \end{bmatrix} = 1 \cdot 0 + 0 \cdot (-1) + (-1) \cdot 4 + 1 \cdot 0 = -4$

(c) $u \cdot w$ undefined

(d) $A^2 = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 1+2 & 2+6 \\ 1+3 & 2+9 \end{bmatrix} = \begin{bmatrix} 3 & 8 \\ 4 & 11 \end{bmatrix}$

(e) $BC = \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & -2 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} (1+0+0) & (2+0+1) \\ (-1-6+0) & (-2+4+3) \end{bmatrix} = \begin{bmatrix} 1 & 3 \\ -7 & 5 \end{bmatrix}$

$$(f) Bv = \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix} \begin{bmatrix} 0 \\ -1 \\ 0 \end{bmatrix} \quad \text{undefined}$$

$$(g) Bw = \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix} \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} 2+0-1 \\ -2+0-3 \end{bmatrix} = \begin{bmatrix} 1 \\ -5 \end{bmatrix}$$

$$(h) Cw = \begin{bmatrix} 1 & 2 \\ 3 & -2 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} \quad \text{undefined}$$

$$(i) B+B^T = \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix}^T = \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ 0 & -2 \\ 1 & 3 \end{bmatrix} \quad \text{undefined}$$

$$(j) B+C^T = \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ 3 & -2 \\ 0 & 1 \end{bmatrix}^T = \begin{bmatrix} 1 & 0 & 1 \\ -1 & -2 & 3 \end{bmatrix} + \begin{bmatrix} 1 & 3 & 0 \\ 2 & -2 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 3 & 1 \\ 1 & -4 & 4 \end{bmatrix}$$