MATH 260 – QUIZ #2 *Name:* KEY

Directions: This is a take home quiz. This quiz is due at the beginning of class on Tuesday, March 26, 2019. Please show all work for maximum credit. This quiz is worth 10 points. Good luck!

(4 points) 1. Prove the following: If A is an $m \times n$ matrix, and c and d are scalars, then $(c+d)A = cA + dA$. $A = [a_{ij}]$

$$(c+d)A = (c+d)[a_{ij}] = [(c+d)a_{ij}] = [ca_{ij} + da_{ij}] = [ca_{ij}] + [da_{ij}]$$

$$= c[a_{ij}] + d[a_{ij}] = cA + dA$$

2. Given the following matrices: $A = \begin{bmatrix} 2 & 7 \\ -3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 6 & -2 \\ 5 & 3 \end{bmatrix}$

Determine the following:

(1 point) a. $4A - 3B$ $= 4\begin{bmatrix} 2 & 7 \\ -3 & 4 \end{bmatrix} - 3\begin{bmatrix} 6 & -2 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 8 & 28 \\ -12 & 16 \end{bmatrix} + \begin{bmatrix} -18 & 6 \\ -15 & -9 \end{bmatrix}$

$$= \begin{bmatrix} -10 & 34 \\ -27 & 7 \end{bmatrix}$$

(1 point) b. $A^2 = A \cdot A = \begin{bmatrix} 2 & 7 \\ -3 & 4 \end{bmatrix} \cdot \begin{bmatrix} 2 & 7 \\ -3 & 4 \end{bmatrix} = \begin{bmatrix} 4 - 21 & 14 + 28 \\ -6 - 12 & -21 + 16 \end{bmatrix}$

$$= \begin{bmatrix} -17 & 42 \\ -18 & -5 \end{bmatrix}$$

(4 points) 3. Prove the following: If A is an $m \times n$ matrix, and c is a scalar, then $(cA)^T = cA^T$.

$A = [a_{ij}]$

$$(cA)^T = (c[a_{ij}])^T = [ca_{ij}]^T = [ca_{ji}] = c[a_{ji}] = c[a_{ij}]^T$$
$$= cA^T$$