MATH 1300: Quiz #3 – SOLUTIONS

/6   **Problem 1:** Evaluate the following (if possible):

(a) $\begin{bmatrix} 1 & 3 & -2 & 1 \\ 2 & 1 & -1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ -3 & 5 \\ 4 & 6 \end{bmatrix}$

Undefined. The number of columns in the first matrix (4) does not equal the number of rows in the second (3).

(b) $\begin{bmatrix} 3 & 2 & 1 \\ 4 & -2 & 2 \end{bmatrix} \begin{bmatrix} 2 \\ 1 \\ -1 \end{bmatrix} \begin{bmatrix} 1 & -3 & 2 \end{bmatrix}$

$$= \begin{bmatrix} 7 \\ 4 \end{bmatrix} \begin{bmatrix} 1 & -3 & 2 \end{bmatrix} = \begin{bmatrix} 7 & -21 & 14 \\ 4 & -12 & 8 \end{bmatrix}$$

/4   **Problem 2:** Show that the following matrices commute (i.e. that $AB = BA$): $A = \begin{bmatrix} a & b \\ -b & a \end{bmatrix}$, $B = \begin{bmatrix} c & d \\ -d & c \end{bmatrix}$.

$$AB = \begin{bmatrix} a & b \\ -b & a \end{bmatrix} \begin{bmatrix} c & d \\ -d & c \end{bmatrix} = \begin{bmatrix} ac - bd & ad + bc \\ -bc - ad & -bd + ac \end{bmatrix}$$

$$BA = \begin{bmatrix} c & d \\ -d & c \end{bmatrix} \begin{bmatrix} a & b \\ -b & a \end{bmatrix} = \begin{bmatrix} ca - db & cb + da \\ -da - cb & -db + ca \end{bmatrix} = \begin{bmatrix} ac - bd & ad + bc \\ -bc - ad & -bd + ac \end{bmatrix} = AB \quad \checkmark$$