# QUIZ 22 SOLUTIONS: LESSON 32
## APRIL 13, 2018

Write legibly, clearly indicate the question you are answering, and put a box or circle around your final answer. If you do not clearly indicate the question numbers, I will take off points. Write as much work as you need to demonstrate to me that you understand the concepts involved. If you have any questions, raise your hand and I will come over to you.

**1.** [5 pts] Let

$$A = \begin{bmatrix} -1 & 0 \\ 1 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} -2 & 1 \\ 0 & -1 \end{bmatrix}.$$

Find

(a) $2A - 3B$

(b) $A^2$

(c) $BA$

(a) $2A - 3B = 2\begin{bmatrix} -1 & 0 \\ 1 & 1 \end{bmatrix} - 3\begin{bmatrix} -2 & 1 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 2(-1) & 2(0) \\ 2(1) & 2(1) \end{bmatrix} - \begin{bmatrix} 3(-2) & 3(1) \\ 3(0) & 3(-1) \end{bmatrix}$

$= \begin{bmatrix} -2 & 0 \\ 2 & 2 \end{bmatrix} - \begin{bmatrix} -6 & 3 \\ 0 & -3 \end{bmatrix} = \begin{bmatrix} -2-(-6) & 0-3 \\ 2-0 & 2-(-3) \end{bmatrix}$

$= \boxed{\begin{bmatrix} 4 & -3 \\ 2 & 5 \end{bmatrix}}$

(b)

$A^2 = \begin{bmatrix} -1 & 0 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} -1 & 0 \\ 1 & 1 \end{bmatrix}$

$= \begin{bmatrix} -1(-1)+0(1) & -1(0)+0(1) \\ 1(-1)+1(1) & 1(0)+1(1) \end{bmatrix} = \boxed{\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}}$

(c) $BA = \begin{bmatrix} -2 & 1 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} -1 & 0 \\ 1 & 1 \end{bmatrix}$

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

$= \boxed{\begin{bmatrix} 3 & 1 \\ -1 & -1 \end{bmatrix}}$

**2.** [5 pts] Let

$$A = \begin{bmatrix} 0 & 1 \\ -1 & 1 \\ -1 & 2 \end{bmatrix} \text{ and } B = \begin{bmatrix} -1 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix}.$$

Find

(a) $AB$

(b) $BA$

(a) $AB = \begin{bmatrix} 0 & 1 \\ -1 & 1 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} -1 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix} = \begin{bmatrix} 0(-1)+1(1) & 0(0)+1(-1) & 0(2)+1(1) \\ -1(-1)+1(1) & -1(0)+1(-1) & -1(2)+1(1) \\ -1(-1)+2(1) & -1(0)+2(-1) & -1(2)+2(1) \end{bmatrix}$

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

(b) $BA = \begin{bmatrix} -1 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ -1 & 1 \\ -1 & 2 \end{bmatrix}$

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

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