Math 4A: "Quiz" 2 Solutions

Written by Victoria Kala

May 5, 2017

Consider the following matrices:

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}, \quad B = \begin{pmatrix} -1 & 0 \\ 3 & -2 \end{pmatrix}, \quad C = \begin{pmatrix} 0 & 1 \\ 7 & -1 \\ 2 & 4 \end{pmatrix}$$

For each of the following exercises, perform the operation if it is defined. If it is undefined, explain why.

1. $A + B$

   Solution. Undefined, A and B are not the same size. □

2. AB

   Solution. Undefined since A has 3 columns but B has 2 rows. □

3. $A - 3C^T$

   Solution.

   $$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} - 3\begin{pmatrix} 0 & 7 & 2 \\ 1 & -1 & 4 \end{pmatrix} = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} - \begin{pmatrix} 0 & 21 & 6 \\ 1 & -3 & 12 \end{pmatrix} = \begin{pmatrix} 1 & -19 & -3 \\ 3 & 8 & -6 \end{pmatrix}$$

   □

4. CB

   Solution.

   $$\begin{pmatrix} 0 & 1 \\ 7 & -1 \\ 2 & 4 \end{pmatrix}\begin{pmatrix} -1 & 0 \\ 3 & -2 \end{pmatrix} = \begin{pmatrix} 0+3 & 0-2 \\ -7-3 & 0+2 \\ -2+12 & 0-8 \end{pmatrix} = \begin{pmatrix} 3 & -2 \\ -10 & 2 \\ 10 & -8 \end{pmatrix}$$

   □

5. $ACB + 2B$

   Solution. $ACB = A(CB)$. We calculated CB in the previous exercise:

   $$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}\begin{pmatrix} 3 & -2 \\ -10 & 2 \\ 10 & -8 \end{pmatrix} + 2\begin{pmatrix} -1 & 0 \\ 3 & -2 \end{pmatrix} = \begin{pmatrix} 13 & -22 \\ 22 & -46 \end{pmatrix} + \begin{pmatrix} -2 & 0 \\ 6 & -4 \end{pmatrix} = \begin{pmatrix} 11 & -22 \\ 28 & -50 \end{pmatrix}$$

   □

6. CA

Solution.

$$\begin{pmatrix} 0 & 1 \\ 7 & -1 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} = \begin{pmatrix} 0+4 & 0+5 & 0+6 \\ 7-4 & 14-5 & 21-6 \\ 2+16 & 4+20 & 6+24 \end{pmatrix} = \begin{pmatrix} 4 & 5 & 6 \\ 3 & 9 & 15 \\ 18 & 24 & 30 \end{pmatrix}$$

□