Solutions to the Attendance Quiz for Sept. 23, 2010

Let

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

Compute the following expressions, or give a reason why the expression is nonsense.

1. AB

Sol. of 1:

$$AB = \begin{bmatrix} -2 & 4 \\ 5 & 7 \end{bmatrix} \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} (-2)\cdot(1)+(4)\cdot(2) & (-2)\cdot(-1)+(4)\cdot(3) \\ (5)\cdot(1)+(7)\cdot(2) & (5)\cdot(-1)+(7)\cdot(3) \end{bmatrix} = \begin{bmatrix} -2+8 & 2+12 \\ 5+14 & -5+21 \end{bmatrix} = \begin{bmatrix} 6 & 14 \\ 19 & 16 \end{bmatrix} \quad .$$

Comment: About %85 of the people got it right. Most of the other people did it the right way, but messed up with the arithmetics.

2. BA

Sol. of 2:

$$BA = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} -2 & 4 \\ 5 & 7 \end{bmatrix}$$

$$= \begin{bmatrix} (1)\cdot(-2)+(-1)\cdot(5) & (1)\cdot(4)+(-1)\cdot(7) \\ (2)\cdot(-2)+(3)\cdot(5) & (2)\cdot(4)+(3)\cdot(7) \end{bmatrix} = \begin{bmatrix} -2-5 & 4-7 \\ -4+15 & 8+21 \end{bmatrix} = \begin{bmatrix} -7 & -3 \\ 11 & 29 \end{bmatrix} \quad .$$

Comment: About %85 of the people got it right. Most of the other people did it the right way, but messed up with the arithmetics.

3. AC^T

Sol. of 3: A is a 2×2 matrix and C^T is a 3×2 matrix.

You can't multiply them, since the number of columns of A (2) is different than the number of rows (3) of C^T.

Comment: About %75 of the people got it right. Some people got confused and did $(AC)^T$. AC^T means you **first** take the transpose of C, and then multiply A by C^T.

4. BC

Sol. of 4:

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

$$= \begin{bmatrix} (1)\cdot(1)+(-1)\cdot(2) & (1)\cdot(-11)+(-1)\cdot(3) & (1)\cdot(3)+(-1)\cdot(0) \\ (2)\cdot(1)+(3)\cdot(2) & (2)\cdot(-1)+(3)\cdot(2) & (3)\cdot(3)+(3)\cdot(0) \end{bmatrix} = \begin{bmatrix} 1-2 & -1-3 & 3+0 \\ 2+6 & -2+9 & 6+0 \end{bmatrix} = \begin{bmatrix} -1 & -4 & 3 \\ 8 & 7 & 6 \end{bmatrix}$$

Comment: About %70 of the people got it right. Some of the other people did it the right way, but messed up with the arithmetics, and some ran out of time.