Dawson College: Linear Algebra (SCIENCE): 201-NYC-05-S4: Winter 2017

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Quiz 3

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §1.3 #TF *(3 marks)* Determine whether the statement is true or false, and justify your answer.
If B has a column of zeros, then so does AB if this product is defined.

True, Let j be the column of zeros of B. Then the [j^{th} column of AB] $=A$[j^{th} column of B] $= A\begin{bmatrix}0\\0\\\vdots\\0\end{bmatrix} = \begin{bmatrix}0\\0\\\vdots\\0\end{bmatrix}$.

Question 2. §1.3 #TF *(2 marks)* Determine whether the statement is true or false, and justify your answer.
For every matrix A, it is true that $(A^T)^T = A$.

True, let $A=[a_{ij}]$; $(A^T)^T = ([a_{ij}]^T)^T = ([a_{ji}])^T = [a_{ij}] = A$

Question 3. §1.3 #TF *(3 marks)* Determine whether the statement is true or false, and justify your answer.
if $AB+BA$ is defined, then A and B are square matrices of the same size.

True, Let A be an $m\times n$ matrix and B be a $p\times q$ matrix. Since AB is defined $n=p$ and since BA is defined $q=m$. So AB is of dim $m\times m$ and BA is of dim $n\times n$. And since $AB+BA$ is defined $m=n$. Hence B and A are $n\times n$ matrices.

Question 4. §1.2 #7 *(2 marks)* Consider the matrices

$$A=\begin{bmatrix}3&0\\-1&2\\1&1\end{bmatrix},\ B=\begin{bmatrix}4&-1\\0&2\end{bmatrix},\ C=\begin{bmatrix}1&4&2\\3&1&5\end{bmatrix},\ D=\begin{bmatrix}1&5&2\\-1&0&1\\3&2&4\end{bmatrix},\ E=\begin{bmatrix}6&1&3\\-1&1&2\\4&1&3\end{bmatrix}$$

Compute the given expression (if possible).

$$(DA)^T = \left(\begin{bmatrix}1&5&2\\-1&0&1\\3&2&4\end{bmatrix}\begin{bmatrix}3&0\\-1&2\\1&1\end{bmatrix}\right)^T$$

$$= \left(\begin{bmatrix}0&12\\-2&1\\11&8\end{bmatrix}\right)^T$$

$$= \begin{bmatrix}0&-2&11\\12&1&8\end{bmatrix}$$