Dawson College: **Linear Algebra**: 201-NYC-05-S07: Winter 2010

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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. Consider the following matrices

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

a. *(2 marks)* Compute, if possible. Justify.

AB

2×2 3×2 not same $\therefore$ multiplication not defined

b. *(2 marks)* Compute, if possible. Justify.

$(CB)^t$

$$CB=\begin{bmatrix}1&-1&2\\0&2&3\\-5&0&1\end{bmatrix}\begin{bmatrix}0&2\\-1&0\\1&1\end{bmatrix}$$

$$=\begin{bmatrix}3&4\\1&3\\1&-9\end{bmatrix}$$

$$\therefore (CB)^t=\begin{bmatrix}3&1&1\\4&3&-9\end{bmatrix}$$

c. *(2 marks)* Compute, if possible. Justify.

$(BA)^t + B^t$

BA

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

$$=\begin{bmatrix}6&2\\-1&2\\4&-1\end{bmatrix}$$

$$\therefore (BA)^t+B^t$$

$$=\begin{bmatrix}6&-1&4\\2&2&-1\end{bmatrix}+\begin{bmatrix}0&-1&1\\2&0&1\end{bmatrix}$$

$$=\begin{bmatrix}6&-2&5\\4&2&0\end{bmatrix}$$

d. *(2 marks)* Compute, if possible. Justify.

D^tE-2B^t

D^tE-2B^t

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

$$=\begin{bmatrix}1&0&-2\\-2&0&4\end{bmatrix}-\begin{bmatrix}0&-2&2\\4&0&2\end{bmatrix}$$

$$=\begin{bmatrix}1&2&-4\\-6&0&2\end{bmatrix}$$

e. *(2 marks)* Compute, if possible. Justify.

$\mathrm{tr}(BB^t)$

BB^t

$$=\begin{bmatrix}0&2\\-1&0\\1&1\end{bmatrix}\begin{bmatrix}0&-1&1\\2&0&1\end{bmatrix}=\begin{bmatrix}4&0&2\\0&1&-1\\2&-1&2\end{bmatrix}$$

$$\therefore \mathrm{tr}(BB^t)=4+1+2$$
$$=7$$