Dawson College: Linear Algebra: 201-105-DW-S04: Fall 2009

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Quiz 1

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 matrices:

$$A=\begin{bmatrix}2&3&1\\4&0&0\\0&-1&2\end{bmatrix}, B=\begin{bmatrix}1&10&8\\2&0&7\\2&-1&2\end{bmatrix}, C=\begin{bmatrix}2&3\\0&-1\\3&3\end{bmatrix}, D=\begin{bmatrix}2&-1&2\\3&0&1\end{bmatrix}.$$

Compute the following *(where possible)*.

a. *(1 mark)* $A-B$
b. *(1 mark)* $C-D$
c. *(1 mark)* BD
d. *(3 marks)* $2\,\mathrm{tr}(3CD)$
e. *(4 marks)* CC^t-I+A^2

a) $\begin{bmatrix}1&-7&-7\\2&0&-7\\-2&0&0\end{bmatrix}$ b) Not possible since their dimensions are not the same

c) B D Not possible since the dimensions do not match.
3x3 2x3

d) First lets compute $3CD = 3\begin{bmatrix}2&3\\0&-1\\3&3\end{bmatrix}\begin{bmatrix}2&-1&2\\3&0&1\end{bmatrix}$

$= 3\begin{bmatrix}13&-2&7\\-3&0&-1\\15&-3&9\end{bmatrix} = \begin{bmatrix}39&-6&21\\-9&0&-3\\45&-9&27\end{bmatrix}$ $\therefore 2\,tr(3CD)$
$= 2(66) = 132$

e) $\begin{bmatrix}2&3\\0&-1\\3&3\end{bmatrix}\begin{bmatrix}2&0&3\\3&-1&3\end{bmatrix} - \begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix} + \begin{bmatrix}2&3&1\\4&0&0\\0&-1&2\end{bmatrix}\begin{bmatrix}2&3&1\\4&0&0\\0&-1&2\end{bmatrix}$

$= \begin{bmatrix}13&-3&15\\-3&1&-3\\15&-3&18\end{bmatrix} - \begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix} + \begin{bmatrix}16&5&4\\8&12&4\\-4&-2&4\end{bmatrix} = \begin{bmatrix}28&2&19\\5&12&1\\11&-5&21\end{bmatrix}$