

MATH 365

Homework #2, Spring 2012

Due: Wednesday, Feb. 1

1. (20 points) Given $A, B \in \mathbb{R}^{n,p}$ and $C \in \mathbb{R}^{p,q}$, prove that $(A + B)C = AC + BC$.
2. Given the following matrices

$$A = \begin{pmatrix} 0.5688 & 0.1656 & 0.229 & 0.1067 \\ 0.4694 & 0.602 & 0.9133 & 0.9619 \\ 0.0119 & 0.263 & 0.1524 & 0.0046 \\ 0.3371 & 0.6541 & 0.8258 & 0.7749 \\ 0.1622 & 0.6892 & 0.5383 & 0.8173 \\ 0.7943 & 0.7482 & 0.9961 & 0.8687 \\ 0.3112 & 0.4505 & 0.0782 & 0.0844 \\ 0.5285 & 0.0838 & 0.4427 & 0.3998 \end{pmatrix},$$

$$B = \begin{pmatrix} 0.2769 & 0.6948 & 0.4387 & 0.1869 & 0.7094 & 0.6551 & 0.9597 & 0.7513 \\ 0.0462 & 0.3171 & 0.3816 & 0.4898 & 0.7547 & 0.1626 & 0.3404 & 0.2551 \\ 0.0971 & 0.9502 & 0.7655 & 0.4456 & 0.276 & 0.119 & 0.5853 & 0.506 \\ 0.8235 & 0.0344 & 0.7952 & 0.6463 & 0.6797 & 0.4984 & 0.2238 & 0.6991 \end{pmatrix},$$

$$C = \begin{pmatrix} 0.8909 & 0.1493 & 0.8143 & 0.1966 & 0.3517 & 0.9172 & 0.3804 & 0.5308 \\ 0.9593 & 0.2575 & 0.2435 & 0.2511 & 0.8308 & 0.2858 & 0.5678 & 0.7792 \\ 0.5472 & 0.8407 & 0.9293 & 0.616 & 0.5853 & 0.7572 & 0.0759 & 0.934 \\ 0.1386 & 0.2543 & 0.35 & 0.4733 & 0.5497 & 0.7537 & 0.054 & 0.1299 \end{pmatrix},$$

and

$$D = \begin{pmatrix} 3.2090 & -2.5401 & -0.5887 & -1.3159 \\ -9.4480 & 14.7505 & -17.3511 & 16.3668 \\ -5.5400 & -1.1995 & 4.5043 & 3.5049 \\ 12.0418 & -10.3090 & 11.8869 & -17.4378 \end{pmatrix},$$

write and run a source code on the computer to

- (i) (15 points) verify whether $A(B + C) = AB + AC$.
- (ii) (15 points) verify whether $AC = CA$.
- (iii) (20 points) verify whether $(BA)D = B(AD)$. What kind of matrix is $(BA)D$?
- (iv) (20 points) find the transpose matrices of A , B and AB , i.e. A^T , B^T and $(AB)^T$.
- (v) (10 points) verify whether $(AB)^T = B^T A^T$ by using the results obtained in question (iv).