Chapter 3.5

Linear Algebra with applications to differential equations

College of the Atlantic. Winter 2019

1. Consider the following matrices:

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} \tag{1}$$

   (a) Calculate BA.

   (b) Does $AB = BA$?

2. Consider the following two matrices

$$A = \begin{bmatrix} 2 & 1 & 0 & 1 \\ 2 & 1 & -1 & -1 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 3 \\ 3 & 0 \\ 2 & 2 \\ 2 & 2 \end{bmatrix}. \tag{2}$$

   (a) Calculate AB, if it exists.

   (b) Calculate BA, if it exists.

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3. In the following, assume that A and B are invertible matrices of the same size.

   (a) What is $(A^{-1})^{-1}$? Why?

   (b) What is $(A^n)^{-1}$? Why?

   (c) What is $(AB)^{-1}$? Why?

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4. Find the inverse of

$$A = \begin{bmatrix} 1 & -3 \\ -2 & 6 \end{bmatrix}. \tag{3}$$