



[Course](#) > [Unit 2:...](#) > [MATLA...](#) > 5. Expl...

5. Exploration of matrix multiplication

Exploration

2/2 points (graded)

Let \mathbf{A} and \mathbf{B} both be 3×3 matrices. So in particular, we can take the matrix product \mathbf{AB} and the matrix product \mathbf{BA} .

Let \mathbf{A} be the matrix representing the linear transformation that rotates all vectors in \mathbb{R}^3 90 degrees counterclockwise about the positive y -axis.

$$\mathbf{A} = \begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$$

Let \mathbf{B} be the matrix representing the linear transformation that projects all vectors in \mathbb{R}^3 onto the xy -plane.

$$\mathbf{B} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

What is $\mathbf{AB} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$

(Enter as a column vector. Separate entries using a semicolon: for example type **[a ; b; c]** for

the column vector $\begin{pmatrix} a \\ b \\ c \end{pmatrix}$.)

✓ Answer: [0;0;0]

What is $BA \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}$

(Enter as a column vector. Separate entries using a semicolon: for example type **[a ; b; c]** for

the column vector $\begin{pmatrix} a \\ b \\ c \end{pmatrix}$.)

✓ Answer: [-1;0;0]

You have used 1 of 5 attempts

❏ Answers are displayed within the problem

MATLAB activity

Generate two square, random matrices A and B of the same size using [MATLAB online](#).

To do this, type `rand(10)` for example to generate a 10x10 square matrix whose entries are random numbers between 0 and 1. You may wish to shift this by 1/2 and multiply by any number $2n$ to get random entries between $-n$ and n : e.g. `(rand(10)-0.5)*200`.

Find AB .

Find BA .

Does $AB = BA$?

Conjecture based on exploration

1/1 point (graded)

In general, for two $n \times n$ matrices A and B , does $AB = BA$?

☐ Yes.

☒ No. ✓

Solution:

Matrix multiplication is not commutative! That is $AB \neq BA$ for almost all matrices. This somewhat surprising fact makes the study of matrices even more interesting. This is often first example of a non-commutative multiplication people encounter.

Submit

You have used 1 of 1 attempt

i Answers are displayed within the problem

5. Exploration of matrix multiplication

Hide Discussion

Topic: Unit 2: Linear Algebra, Part 2 / 5. Exploration of matrix multiplication

Add a Post

Show all posts ▼

by recent activity ▼

? [5. Exploration of matrix multiplication - Exploration - Quiz \(a\)](#)

6

[Seems to me \(and to Matlab\) the answer for \$A*B*\(0;0;1\)\$ is different from the one given as correct](#)

Learn About Verified Certificates

© All Rights Reserved