Class 3

Matrix
Matrix operations
Determinant

Essentials of Analytical Geometry and Linear Algebra 1

Quiz time !

Pick column and give definitions

Linear independence

Determinant

Subspace

Matrix multiplication

Span

Linear combination

Q & A

Task 1

Let $A = \begin{bmatrix} 3 & 1 \\ 5 & -2 \end{bmatrix}, B = \begin{bmatrix} -2 & 1 \\ 3 & 4 \end{bmatrix}$:

1. Find $A + B$;
2. Find $2A - 3B + I$;
3. Find AB and BA (make sure that, in general, $AB \neq BA$ for matrices);
4. Find AI and IA

What is a I ?

How to multiply 2 matrices ?

Task 2

Let $A = \begin{bmatrix} 2 & -1 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} -2 \\ -1 \\ 3 \end{bmatrix}$:

1. Find AB and BA if they exist;
2. Find $A^T B$ and BA^T if they exist.

What is A^T ?

Task 3

If solution exists, what the dimension of the result matrix. There are several matrices: $\underset{3\times3}{A}, \underset{2\times3}{B}, \underset{3\times2}{C}, \underset{3\times5}{D}, \underset{3\times5}{D}, \underset{1\times2}{E}, \underset{3\times1}{K}$.

1. ABC;
2. AB^TC^T;
3. $EBAE$;
4. $K^T \times K^TCE^T$.

Kahoot time !

Task 4

Find the determinants of the following matrices:

1. $A = \begin{bmatrix} 5 & -2 \\ 1 & 6 \end{bmatrix}$;
2. $B = \begin{bmatrix} 1 & -3 & -1 \\ -2 & 7 & 2 \\ 3 & 2 & -4 \end{bmatrix}$.

What is a determinant?

Task 5

A triangle is constructed on vectors $\mathrm{a} = \begin{bmatrix} 2 \\ 4 \\ -1 \end{bmatrix}$ and $\mathrm{b} = \begin{bmatrix} -2 \\ 1 \\ 1 \end{bmatrix}$.

1. Find the area of this triangle.
2. Find the altitudes of this triangle.

Task 6

Find the matrix product AB if$A = \begin{bmatrix} 1 & 2 & 5 \\ 3 & 7 & x \end{bmatrix}$,$B = \begin{bmatrix} 5 & -1 \\ x & 2 \\ -3 & -1 \end{bmatrix}$.

Then find the largest possible value of $det(AB)$.

Task 7

Find the scalar triple product of $a = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$, $b = \begin{bmatrix} 7 \\ 3 \\ -5 \end{bmatrix}$, $c = \begin{bmatrix} 3 \\ 4 \\ -3 \end{bmatrix}$.

What is a scalar triple product ?

Quiz task

- Is there exists AB? If so, find it.
- Is there exists BA? If so, find it.
- What is A^T and B^T?
- Is there exists $|A|$, $|B|$, $|AB|$ and $|BA|$? Find all which is possible to find.

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