COURSE ON MATRICES

LESSON 3

Inverse of a Matrix

HOMEWORK

Part 1: TEST

Select the correct answer (only one is true).

Question 1

An identity matrix is:

a) A matrix whose elements are only 1s
b) A zero matrix that contains the number 1 as an element
c) A square matrix with 1s on the main diagonal and all other elements equal to 0
d) A matrix whose determinant equals 0

Question 2

If we multiply a matrix A by its inverse, we always get:

a) the identity matrix
b) matrix A
c) the inverse of A
d) the transpose of multiplied by the reciprocal of its determinant A

Question 3

What sufficient conditions must a matrix A satisfy for the inverse matrix A^{-1} to exist?

a) It must be rectangular
b) It must be square
c) It must be square and have a non-zero determinant
d) It must have 1s on the main diagonal

Question 4

$$[-2]$$

The inverse of the above matrix is:

a) $[-2]$
b) $[2]$
c) Działanie niewykonalne
d) $\left[-\frac{1}{2}\right]$

Question 5

The inverse of matrix A can be defined as:

a) The product of matrix A and its inverse
b) The product of the reciprocal of $\det(A)$ and the transpose of the cofactor matrix of A
c) Matrix $A$with rows and columns swapped
d) The transpose of A with a non-zero determinant

Question 6

$$\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

What is the inverse of this matrix?

a) $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

b) $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

c) $\frac{1}{3}\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$

Question 7

How can we check our result after calculating the inverse of A?

a) Check whether the result is the identity matrix
b) Check whether the result equals matrix A
c) Multiply the result by matrix A (we should then obtain the identity matrix)
d) Checking is not possible

Question 8

$$\begin{bmatrix} -1 & 3 & 2 \\ -2 & 2 & 3 \\ -1 & 4 & 2 \end{bmatrix}$$

The element in the **3rd row and 2nd column** of the cofactor matrix equals:

a) $-\begin{vmatrix} -1 & 3 \\ -1 & 4 \end{vmatrix}$

b) $\begin{vmatrix} 3 & 2 \\ 2 & 3 \end{vmatrix}$

c) $-\begin{vmatrix} -1 & 2 \\ -2 & 3 \end{vmatrix}$

d) $\begin{vmatrix} -1 & 2 \\ -1 & 2 \end{vmatrix}$

Question 9

$$|A| = 3 \qquad A^D = \begin{bmatrix} 2 & -2 & 1 \\ 3 & 4 & 2 \\ -1 & 5 & 2 \end{bmatrix}$$

Using the data above, we can compute that A^{-1} equals:

a) $\begin{bmatrix} 6 & -6 & 3 \\ 9 & 12 & 6 \\ -3 & 15 & 6 \end{bmatrix}$

b) $\frac{1}{3}\begin{bmatrix} 2 & 3 & -1 \\ -2 & 4 & 5 \\ 1 & 2 & 2 \end{bmatrix}$

c) $\frac{1}{3}\begin{bmatrix} 2 & -2 & 1 \\ 3 & 4 & 2 \\ -1 & 5 & 2 \end{bmatrix}$

d) Not enough data

Question 10

$$\begin{bmatrix} -1 & 2 & 5 & 2 \\ 3 & 3 & 2 & 2 \\ -1 & 4 & 5 & 8 \\ -10 & 20 & 2 & 1 \end{bmatrix}$$

Calculating the **inverse of a matrix** for the above matrix:

a) is possible
b) is not possible

Part 2: EXERCISES

Ex. 1

Calculate inverse of matrices:

1) $\left[-3\right]^{-1}$

2) $\begin{bmatrix} -1 & 1 \\ -2 & 1 \end{bmatrix}^{-1}$

3) $\begin{bmatrix} -3 & 9 \\ -1 & 3 \end{bmatrix}^{-1}$

4) $\begin{bmatrix} 3 & 4 \\ -3 & 5 \end{bmatrix}^{-1}$

5) $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 3 & 4 \end{bmatrix}^{-1}$

6) $\begin{bmatrix} 2 & -1 & 0 \\ -3 & 4 & 3 \\ 9 & -5 & -2 \end{bmatrix}^{-1}$

7) $\begin{bmatrix} 1 & -2 & -1 \\ -1 & 0 & -2 \\ -2 & -2 & 1 \end{bmatrix}^{-1}$

END