Topic: Zero matrices

Question: Choose the O_{4x2} matrix.

Answer choices:

A $O_{4x2} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

B $O_{4x2} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$

C $O_{4x2} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

D $O_{4x2} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

Solution: B

We always name the zero matrix with a capital O. And optionally, you can add a subscript with the dimensions of the zero matrix. Since the values in a zero matrix are all zeros, just having the dimensions of the zero matrix tells you what the entire matrix looks like.

So O_{4x2} is a matrix with four rows and two columns, completely filled with 0 entries.

$$O_{4x2} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$$

Topic: Zero matrices

Question: What are the dimensions of the zero matrix in $M + O = M$?

$$M = \begin{bmatrix} -5 & 0 & 3 & 1 \\ 8 & -15 & -4 & 7 \end{bmatrix}$$

Answer choices:

A 2×4

B 4×2

C 2×2

D 4×4

Solution: A

Adding the zero matrix to any other matrix does not change the matrix's value.

$$M + O = M$$

$$\begin{bmatrix} -5 & 0 & 3 & 1 \\ 8 & -15 & -4 & 7 \end{bmatrix} + O = \begin{bmatrix} -5 & 0 & 3 & 1 \\ 8 & -15 & -4 & 7 \end{bmatrix}$$

Just like with non-zero matrices, matrix dimensions have to be the same in order to be able to add them. The dimensions of M are 2×4, so the dimensions of the zero matrix must also be 2×4.

Topic: Zero matrices

Question: Which matrix is equivalent to $A + (-A)$, where A is a 2×3 matrix?

Answer choices:

A 0

B $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

C $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

D $\begin{bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$

Solution: C

Matrices A and $-A$ are opposite matrices. Adding opposite matrices always results in the zero matrix.

Since A is 2×3 matrix, $-A$ is also a 2×3 matrix. Therefore, $A + (-A)$ is the $O_{2\times3}$ matrix with 2 rows and 3 columns, completely filled with 0 entries.