Topic: Vectors

Question: How many row vectors and column vectors are in matrix K?

$$K = \begin{bmatrix} 1 & -1 & 1 & 4 \\ -2 & 1 & 0 & -1 \\ 0 & 0 & 3 & 1 \end{bmatrix}$$

Answer choices:

A K has 3 row vectors and 4 column vectors

B K has 4 row vectors and 3 column vectors

C K has 3 row vectors and 3 column vectors

D K has 4 row vectors and 4 column vectors

Solution: A

The matrix K has 3 rows and 4 columns, which means it'll have 3 row vectors and 4 column vectors. The row vectors of K,

$$K = \begin{bmatrix} 1 & -1 & 1 & 4 \\ -2 & 1 & 0 & -1 \\ 0 & 0 & 3 & 1 \end{bmatrix}$$

are given by

$$k_1 = [1 \quad -1 \quad 1 \quad 4]$$

$$k_2 = [-2 \quad 1 \quad 0 \quad -1]$$

$$k_3 = [0 \quad 0 \quad 3 \quad 1]$$

And the column vectors of K are given by

$$k_1 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}, k_2 = \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}, k_3 = \begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix}, k_4 = \begin{bmatrix} 4 \\ -1 \\ 1 \end{bmatrix}$$

Topic: Vectors

Question: Name the column vectors of A.

$$A = \begin{bmatrix} 2 & 1 & 3 & 1 \\ 4 & -2 & 8 & 4 \\ 5 & 6 & -2 & -3 \end{bmatrix}$$

Answer choices:

A $\quad \vec{a}_1 = \begin{bmatrix} 2 \\ 4 \\ 5 \end{bmatrix}$

B $\quad \vec{a}_1 = \begin{bmatrix} 2 \\ 4 \\ 5 \end{bmatrix}, \vec{a}_2 = \begin{bmatrix} 1 \\ -2 \\ 6 \end{bmatrix}$

C $\quad \vec{a}_1 = \begin{bmatrix} 2 \\ 4 \\ 5 \end{bmatrix}, \vec{a}_2 = \begin{bmatrix} 1 \\ -2 \\ 6 \end{bmatrix}, \vec{a}_3 = \begin{bmatrix} 3 \\ 8 \\ -2 \end{bmatrix}$

D $\quad \vec{a}_1 = \begin{bmatrix} 2 \\ 4 \\ 5 \end{bmatrix}, \vec{a}_2 = \begin{bmatrix} 1 \\ -2 \\ 6 \end{bmatrix}, \vec{a}_3 = \begin{bmatrix} 3 \\ 8 \\ -2 \end{bmatrix}, \vec{a}_4 = \begin{bmatrix} 1 \\ 4 \\ -3 \end{bmatrix}$

Solution: D

The column vectors of a matrix are the individual columns of the matrix. In the matrix A,

$$A = \begin{bmatrix} 2 & 1 & 3 & 1 \\ 4 & -2 & 8 & 4 \\ 5 & 6 & -2 & -3 \end{bmatrix}$$

there are four columns, which means we'll have four column vectors.

$$\vec{a}_1 = \begin{bmatrix} 2 \\ 4 \\ 5 \end{bmatrix}, \vec{a}_2 = \begin{bmatrix} 1 \\ -2 \\ 6 \end{bmatrix}, \vec{a}_3 = \begin{bmatrix} 3 \\ 8 \\ -2 \end{bmatrix}, \vec{a}_4 = \begin{bmatrix} 1 \\ 4 \\ -3 \end{bmatrix}$$

Topic: Vectors

Question: Name the row vectors of A.

$$A = \begin{bmatrix} 2 & 1 & 3 & 1 \\ 4 & -2 & 8 & 4 \\ 5 & 6 & -2 & -3 \end{bmatrix}$$

Answer choices:

A $\quad \vec{a}_1 = [2 \quad 1 \quad 3 \quad 1]$

B $\quad \vec{a}_1 = [2 \quad 1 \quad 3 \quad 1],\ \vec{a}_2 = [4 \quad -2 \quad 8 \quad 4]$

C $\quad \vec{a}_1 = [2 \quad 1 \quad 3 \quad 1],\ \vec{a}_2 = [4 \quad -2 \quad 8 \quad 4],\ \vec{a}_3 = [5 \quad 6 \quad -2 \quad -3]$

D $\quad \vec{a}_1 = [2 \quad 1 \quad 3 \quad 1],\ \vec{a}_2 = [4 \quad -2 \quad 8 \quad 4],\ \vec{a}_3 = [6 \quad -1 \quad 11 \quad 5]$

Solution: C

The row vectors of a matrix are the individual rows of the matrix. In the matrix A,

$$A = \begin{bmatrix} 2 & 1 & 3 & 1 \\ 4 & -2 & 8 & 4 \\ 5 & 6 & -2 & -3 \end{bmatrix}$$

there are three rows, which means we'll have three row vectors.

$$\vec{a}_1 = [2 \quad 1 \quad 3 \quad 1]$$

$$\vec{a}_2 = [4 \quad -2 \quad 8 \quad 4]$$

$$\vec{a}_3 = [5 \quad 6 \quad -2 \quad -3]$$