# EQUALITY OF TWO MATRICES

Created: Thursday, 24 November 2011 13:11 | Published: Thursday, 24 November 2011 13:11 | Written by Super User | Print

# Equality of two Matrices



Two matrices $A = [a_{ij}]$ and $B = [b_{ij}]$ are said to be equal if they are of same order and each element of A is equal to the corresponding element of B, that is $a_{ij} = b_{ij}$ for all i and j.  Symbolically we write it as A = B

For example: If $\begin{pmatrix} x + 3 & z + 4 & 2y - 7 \\ -6 & a - 1 & 0 \\ b - 3 & -21 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 6 & 3y - 2 \\ -6 & -3 & 2c + 2 \\ 2b + 4 & -21 & 0 \end{pmatrix}$

Find the values of a, b, c, x, y and z

Solution: Since the matrices are equal, corresponding elements are equal

x + 3 = 0

x = -3

z + 4 = 6

z = 2

2y – 7 = 3y - 2

2y - 3y = -2 + 7

y = -5

a – 1 = -3

a = -2

2c + 2 = 0

c = -1

b – 3 = 2b + 4

b - 2b = 7

b = -7

Hence, a = -2, b = -7, c = -1, x = -3, y = -5 and z = 2.

Try this:

1. Given that the following matrices are equal, find the values of x and y.

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

$$B = \begin{pmatrix} x & 2 \\ 3 & y \end{pmatrix}$$

(Answer: x = 1, y = 4)

2. Given that the following matrices are equal, find the values of x, y, and z.

$$A = \begin{pmatrix} 4 & 0 \\ 6 & -2 \\ 3 & 1 \end{pmatrix}$$

$$B = \begin{pmatrix} x & 0 \\ 6 & y + 4 \\ z/3 & 1 \end{pmatrix}$$

(Answer: x = 4, y = –6, and z = 9)

# Construction of a Matrix

When the general term and the order of a matrix is given, we can easily construct a matrix.

For example:  Construct a 3 x 4 matrix whose elements are given by $a_{ij} = 2i - j$

$$\text{Let the matrix be } A = \begin{pmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \end{pmatrix}$$

$a_{11} = 2 – 1 = 1 \quad a_{12} = 2 – 2 = 0 \quad a_{13} = 2 – 3 = -1 \quad a_{14} = 2 – 4 = -2$

$a_{21} = 4 – 1 = 3 \quad a_{22} = 4 – 2 = 2 \quad a_{23} = 4 – 3 = 1 \quad a_{24} = 4 – 4 = 0$

$a_{31} = 6 - 1 = 5 \quad a_{32} = 6 – 2 = 4 \quad a_{33} = 6 – 3 = 3 \quad a_{34} = 6 – 4 = 2$

$$A = \begin{pmatrix} 1 & 0 & -1 & -2 \\ 3 & 2 & 1 & 0 \\ 5 & 4 & 3 & 2 \end{pmatrix}$$

Now try it yourself!  Should you still need any help, click here to schedule live online session with e Tutor!

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# Reference Links:

- http://en.wikipedia.org/wiki/Matrix_(mathematics)
- http://www.mathreference.com/la-mpoly,order.html
- http://wiki.answers.com/Q/What_is_order_of_the_resultant_matrix_AB_when_two_matrices_are_multiplied_and_the_order_of_the

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