## EQUALITY OF TWO MATRICES

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## Equality of two Matrices



Twomatrices $\mathrm{A}=\left[\mathrm{a}_{\mathrm{ij}}\right]$ and $\mathrm{B}=\left[\mathrm{b}_{\mathrm{ij}}\right]$ are said to be equal if they are of sameorder and each element of A isequal to the corresponding element of $B$, that is $a_{i j}=b_{i j}$ for all $i$ and $j$. Symbolically we write it as $A=B$

For example: $\operatorname{If}\left(\begin{array}{ccc}x+3 & z+4 & 2 y-7 \\ -6 & a-1 & 0 \\ b-3 & -21 & 0\end{array}\right]=\left[\begin{array}{lll}0 & 6 & 3 y-2 \\ -6 & -3 & 2 c+2 \\ 2 b+4 & -21 & 0\end{array}\right]$
Find the values of $\mathrm{a}, \mathrm{b}, \mathrm{c}, \mathrm{x}, \mathrm{y}$ and z
Solution: Since the matrices are equal, corresponding elements are equal
$x+3=0$
$\mathrm{x}=-3$
$z+4=6$
$\mathrm{z}=2$
$2 \mathrm{y}-7=3 \mathrm{y}-2$
$2 y-3 y=-2+7$
$y=-5$
$\mathrm{a}-1=-3$
$\mathrm{a}=-2$
$2 \mathrm{c}+2=0$
$\mathrm{c}=-1$
$b-3=2 b+4$
b-2b=7
$\mathrm{b}=-7$

Hence, $\mathrm{a}=-2, \mathrm{~b}=-7, \mathrm{c}=-1, \mathrm{x}=-3, \mathrm{y}=-5$ and $\mathrm{z}=2$.
Try this:

1. Given that the following matrices are equal, find the values of $x$ and $y$.
$A=\left(\begin{array}{ll}1 & 2 \\ 3 & 4\end{array}\right)$
$B=\left(\begin{array}{ll}x & 2 \\ 3 & y\end{array}\right)$
(Answer: $\mathrm{x}=1, \mathrm{y}=4$ )
2. Given that the following matrices are equal, find the values of $\mathrm{x}, \mathrm{y}$, and z .
$A=\left(\begin{array}{ll}4 & 0 \\ 6 & -2 \\ 3 & 1\end{array}\right)$
$B=\left(\begin{array}{ll}x & 0 \\ 6 & y+4 \\ z & / 3\end{array}\right)$
(Answer: $\mathrm{x}=4, \mathrm{y}=-6$, and $\mathrm{z}=9$ )

## 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 $3 \times 4$ matrix whose elements are given by $\mathrm{a}_{\mathrm{ij}}=2 \mathrm{i}-\mathrm{j}$
Let the matrix be $A=\left(\begin{array}{llll}a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34}\end{array}\right)$
$\mathrm{a} 11=2-1=1 \quad$ a $12=2-2=0 \quad$ a $13=2-3=-1 \quad$ a $14=2-4=-2$
$\mathrm{a} 21=4-1=3 \quad \mathrm{a} 22=4-2=2 \quad \mathrm{a} 23=4-3=1 \quad \mathrm{a} 24=4-4=0$
$\mathrm{a}_{31}=6-1=5 \quad \mathrm{a}_{32}=6-2=4 \quad \mathrm{a}_{33}=6-3=3 \quad \mathrm{a}_{34}=6-4=2$
$A=\left(\begin{array}{cccc}1 & 0 & -1 & -2 \\ 3 & 2 & 1 & 0 \\ 5 & 4 & 3 & 2\end{array}\right)$

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 Category:ROOT
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