Matrices lesson 3 - Scalar multiplication, solving simple eqns

Magic Monk Tutorials

1 Evaluate the following given the following matrices:

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

1.1 4A

$$4A = 4 \cdot \begin{pmatrix} 1 & 3 \\ 2 & 3 \\ 3 & 1 \end{pmatrix} = \begin{pmatrix} 4 & 12 \\ 8 & 12 \\ 12 & 4 \end{pmatrix}$$

1.2 -2B

$$-2B = -2 \cdot \begin{pmatrix} 4 & 2 \\ 5 & 1 \\ 3 & 0 \end{pmatrix} = \begin{pmatrix} -8 & -4 \\ -10 & -2 \\ -6 & 0 \end{pmatrix}$$

1.3 4A-2B

$$4A - 2B = 4 \cdot \begin{pmatrix} 1 & 3 \\ 2 & 3 \\ 3 & 1 \end{pmatrix} - 2 \cdot \begin{pmatrix} 4 & 2 \\ 5 & 1 \\ 3 & 0 \end{pmatrix} = \begin{pmatrix} 4 & 12 \\ 8 & 12 \\ 12 & 4 \end{pmatrix} - \begin{pmatrix} 8 & 4 \\ 10 & 2 \\ 6 & 0 \end{pmatrix} = \begin{pmatrix} -4 & 8 \\ -2 & 10 \\ 6 & 4 \end{pmatrix}$$

1.4 2A+2B

$$2A + 2B = 2 \cdot \begin{pmatrix} 1 & 3 \\ 2 & 3 \\ 3 & 1 \end{pmatrix} + 2 \cdot \begin{pmatrix} 4 & 2 \\ 5 & 1 \\ 3 & 0 \end{pmatrix} = \begin{pmatrix} 2 & 6 \\ 4 & 6 \\ 6 & 2 \end{pmatrix} + \begin{pmatrix} 8 & 4 \\ 10 & 2 \\ 6 & 0 \end{pmatrix} = \begin{pmatrix} 10 & 10 \\ 14 & 8 \\ 12 & 2 \end{pmatrix}$$

2 Evaluate the following given the following matrices:

$C = \begin{pmatrix} 2 & 4 \\ 2 & 3 \end{pmatrix}$, $D = \begin{pmatrix} 2 & 5 \\ 1 & 3 \end{pmatrix}$

2.1 2C-3D

$$2C - 3D = 2 \cdot \begin{pmatrix} -1 & -2 \\ 2 & 3 \end{pmatrix} - 3 \cdot \begin{pmatrix} 2 & 4 \\ 5 & 3 \end{pmatrix} = \begin{pmatrix} -2 & -4 \\ 4 & 6 \end{pmatrix} - \begin{pmatrix} 6 & 12 \\ 15 & 9 \end{pmatrix} = \begin{pmatrix} -8 & -16 \\ -11 & -3 \end{pmatrix}$$

3 Find a 2x2 matrix X such that $3X + A = B$ where $A = \begin{pmatrix} -1 & -2 \\ 2 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 4 \\ 5 & 3 \end{pmatrix}$.

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

$$3X = \begin{pmatrix} 3 & 6 \\ 3 & 0 \end{pmatrix}$$
$$X = \tfrac{1}{3} \cdot \begin{pmatrix} 3 & 6 \\ 3 & 0 \end{pmatrix}$$
$$X = \begin{pmatrix} 1 & 2 \\ 1 & 0 \end{pmatrix}$$