MATRICES USING CAS

Addition and subtraction of matrices

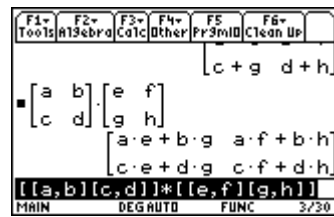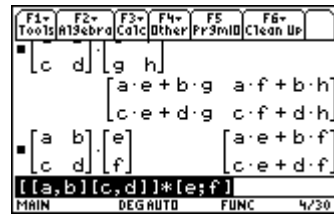|	
CAS is an easy and effective way of calculating matrices.	
Complete Ex 18(a) Evaluate the matrix additions 'by hand'. Check you solutions using the CAS.	
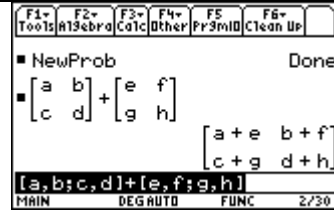
Multiplication of Matrices

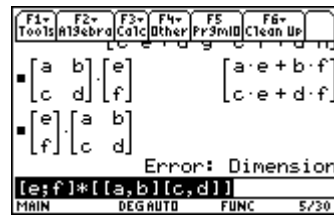|	
Note the pattern with matrix multiplication.	
Investigate with other types of matrices. The order of the resultant matrix is a 2 by 1. (number of rows X number of columns)	
What happens if you reverse the order of the multiplication? Hence matrix multiplication is NOT commutative.	

Hence if A (m x n) matrix and B (n x p) matrix then the resultant matrix is
AB (m x p) matrix.
BUT
BA is not conformable for multiplication…

Complete exercises in Ex 18(b) using CAS.

Solving simultaneous equations using matrices and CAS

$2x - 1y = 4$
$1x + 2y = -3$

This can be represented by matrix multiplication.

$$\begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ -3 \end{bmatrix}$$

Using matrix multiplication and CAS is an easy way for solving for *x* and *y*.

The equations must be set up in the following forms. $2x - 1y = 4$ $1x + 2y = -3$	Using the **simult(** function which can be found in **CATOLOG**
Use the SOLVE (can be found under F2) is a very easy way of solving 2 simultaneous equations in 2 unknowns. $2x - 1y = 4$ $1x + 2y = -3$	Use the SOLVE in CAS to find the point of intersection.
Using the **simult(** function solve the simultaneous equations in Ex 18(c)	

Exercises:

1. Express each of the following pairs of simultaneous equations as a single matrix equation and SOLVE these equations simultaneously.

(i)

$$3x + 4y = 24$$

$$x - 6y = 18$$

(ii)

$$7x - 3y = 27$$

$$-2x + 5y = -31$$

(iii)

$$6x = 5y$$

$$x + y = 1$$

Check your solutions by using the SOLVE function on your CAS.

2. Write each of the following matrix equations as a pair of simultaneous equations and **solve** them using "by hand" skills.

(i) $$\begin{bmatrix} 3 & 2 \\ 2 & 5 \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 20 \\ 12 \end{bmatrix}$$ (ii) $$\begin{bmatrix} -7 & -1 \\ 6 & -4 \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -2 \\ 10 \end{bmatrix}$$ (iii)

$$\begin{bmatrix} 2.4 & -0.2 \\ \frac{1}{2} & \frac{2}{3} \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 1.4 \end{bmatrix}$$

3. **Verify** each of the solutions in 2 above by using matrix multiplication, and **check** this by drawing the graph of the two linear relations on the same set of axes and identifying the point of intersection (using CAS).