Concept –Matrix Arithmetic

Even though you always have access to your CAS calculator it is still important to have an understanding of how to complete operations with matrices by hand.

Addition and Subtraction

Recall that to be able to add or subtract matrices we need to check two things
1. Matrices must be of the same order.
2. When adding or subtracting we need to ensure we are using the same elements.
    i.e. $a_{11} + b_{11}$, $a_{12} + b_{12}$, etc.

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

Eg: Calculate

       A + B   B + C

Scalar Multiplication

In the matrices topic a scalar is _____
When a matrix is multiplied by a scalar, simply multiply each element in the matrix by the scalar.

Eg: Calculate

      2A $\frac{1}{3}C$ $3A - 2B$

Equal Matrices

For matrices to be equal they must _____ and each

corresponding element must be _____.

For Example:

Matrix Multiplication

The order of matrices is very important when completing matrix multiplication.

$$(rows_1, \ columns_1) \times (rows_2, \ columns_2)$$

If the matrix product is defined, the matrix multiplication is completed as shown below.

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 5 & 1 \\ -2 & 2 \end{bmatrix} = \begin{bmatrix} & \\ & \end{bmatrix} = \begin{bmatrix} & \\ & \end{bmatrix}$$

The order of multiplication of matrices matters. Use your CAS calculator to prove that
AxB ≠ BxA

Worked Example
Find two 2x2 matrices. Perform a scalar multiplication on one then multiply both matrices together clearly showing each step of the process.