MA 162

Week 5 Recitation Worksheet (Tuesday)

$\boxed{\textbf{You must show all work to receive full credit.}}$

This worksheet serves as an introduction to matrix arithmetic. A *matrix* is a rectangular array of numbers enclosed by brackets. An $m \times n$ matrix has m rows and n columns.

Addition

The sum of two $m \times n$ matrices A and B is the $m \times n$ matrix $A + B$ obtained by adding the corresponding entries of A and B.

1. Define A, B and C as

$$A = \begin{bmatrix} -2 & 1 \\ 3 & 3 \\ -6 & -9 \end{bmatrix}, \quad B = \begin{bmatrix} -6 & 2 \\ -4 & -7 \\ 7 & -5 \end{bmatrix} \quad \text{and} \quad C = \begin{bmatrix} -4 & -7 & -4 \\ -8 & -5 & 5 \end{bmatrix}.$$

Determine the following matrices, if possible.

(a*) $A + C$

(b*) $A + B$

(c) $B + A$

Subtraction

The difference of two $m \times n$ matrices A and B is the $m \times n$ matrix $A - B$ obtained by subtracting the corresponding entries of A and B.

2. Define A, B and C as

$$A = \begin{bmatrix} -2 & 1 \\ 3 & 3 \\ -6 & -9 \end{bmatrix}, \quad B = \begin{bmatrix} -6 & 2 \\ -4 & -7 \\ 7 & -5 \end{bmatrix} \quad \text{and} \quad C = \begin{bmatrix} -4 & -7 & -4 \\ -8 & -5 & 5 \end{bmatrix}.$$

Determine the following matrices, if possible.

(a*) $A - C$

(b*) $A - B$

(c) $B - A$

Scalar Multiplication

The product of a scalar (constant) c and $m \times n$ matrix A is the $m \times n$ matrix cA obtained by scaling (multiplying) every entry of A by c.

3. Define
$$A = \begin{bmatrix} -2 & 1 \\ 3 & 3 \\ -6 & -9 \end{bmatrix}.$$

Determine the following matrices, if possible.

(a*) $0A$

(b*) $4A$

(c) $-5A$

Matrix Multiplication

For matrices A and B, the matrix product AB exists only if the number of columns of A equals the number of rows of B. That is, if A is an $m \times n$ matrix, then B must be an $n \times k$ matrix and the product AB is an $m \times k$ matrix. The entry in row i and column j of the product AB is obtained by multiplying row i of matrix A by column j of matrix B.

4. Define A, B and C as

$$A = \begin{bmatrix} -2 & 1 \\ 3 & 3 \\ -6 & -9 \end{bmatrix}, \quad B = \begin{bmatrix} -6 & 2 \\ -4 & -7 \\ 7 & -5 \end{bmatrix} \quad \text{and} \quad C = \begin{bmatrix} -4 & -7 & -4 \\ -8 & -5 & 5 \end{bmatrix}.$$

Determine the following matrices, if possible.

(a*) AB

(b*) AC

(c) CA