§2.1 Matrix Operations

If A is an $m \times n$ matrix, then the scalar entry in the i^{th} row and j^{th} column of A is denoted by a_{ij}.

The diagonal entries in an $m \times n$ matrix $A = [a_{ij}]$ are a_{11}, a_{22}, a_{33}, ..., and they form the main diagonal of A. A diagonal matrix is a square $n \times n$ matrix whose nondiagonal entries are zero. An example is the $n \times n$ identity matrix, I_n. An $m \times n$ matrix whose entries are all zero is a zero matrix.

If A is an $m \times n$ matrix, and if B is an $n \times p$ matrix, then the product AB is an $m \times p$ matrix.

The position of the factors in the product AB is emphasized by saying that A is right-multiplied by B or that B is left-multiplied by A. If $AB = BA$, then A and B commute with one another.

In general, $AB \neq BA$.

If $AB = AC$, then it is not true in general that $B = C$.

If a product AB is the zero matrix, you cannot conclude in general that either $A = 0$ or $B = 0$.

If A is an $m \times n$ matrix, then the transpose of A, denoted A^T, is an $n \times m$ matrix whose columns are formed from the corresponding rows of A.