

Matrices (plural of matrix)

Matrix:

data organized into rows and columns

Dimensions:

the number of rows and columns in a matrix

2x3 reads "two by three" (it has 2 rows and 3 columns)

Rows:

horizontal and always listed first

Columns:

vertical and listed last

Equal matrices:

ALWAYS have same dimensions, AND ALL corresponding elements (same row/column) are equal

Matrices, cont.

Zero matrix:

contains ONLY zeros (equivalent to 0 in number world)

Square matrix:

number of rows and columns are the same

Identity matrix:

SQUARE matrix with "1" in main diagonal and "0" everywhere else (equivalent to 1 in number world)

Inverse matrix:

SQUARE matrix equivalent to "reciprocal" (product of inverse matrices results in identity matrix)

Only square matrices can have an inverse!

Also, the determinant cannot be "0"!

Operations with Matrices

Addition:

matrix dimensions MUST be same

- * add matrices by adding corresponding elements**

Subtraction:

matrix dimensions MUST be same

- * subtract matrices by subtracting corresponding elements**

Scalar Multiplication:

ALWAYS possible; similar to distribution

- * multiply each element by scalar**

Operations with Matrices

Multiplication:

easily done on calculator

first matrix's number of columns MUST match second matrix's number of rows; product matrix has dimensions of first matrix's number of rows and second matrix's number of columns

*** commutative property DOES NOT apply**

Division:

like fractions, division is not performed

*** to divide matrices, multiply by second matrix's inverse**

Determinant of a 2x2 Matrix:

for a 2x2 matrix, with elements a, b, c, and d,
the determinant is ad - bc

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

Inverse Form for 2x2 Matrix:

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}^{-1} = \frac{1}{ad-bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$