

Operators



Important

- x and y represent numerical values or variables.
- m , n , and p represent integer values or variables.
- a and b represent boolean values or variables.
- U and V represent matrices of numerical values.
- A and B represent matrices of boolean values.

Arithmetic operators

Operator	Operator name	Syntax
$+$	Addition	$x+y$ $U + V$ (U and V are $m \times n$ matrices)
$-$	Subtraction	$x-y$ $U - V$ (U and V are $m \times n$ matrices)
$*$	Multiplication	$x*y$ $U * V$ (U is an $m \times n$ matrix and V is an $n \times p$ matrix)
$/$	Division	x/y
$\%$	Modulus	$m \% n$ $U \% V$ (U and V are $m \times n$ matrices of integer values). This operator operates element-wise on matrices.
$!$	Factorial	$m!$
$^$	Power	x^y
\backslash	Left division	$x \backslash y$ is equivalent to $(1/x) * y$ $U \backslash V$ (U and V are $m \times n$ matrices) is equivalent to $(1/U) * V$
$.*$	Element-wise multiplication	$U .* V$ (U and V are $m \times n$ matrices)
$./$	Element-wise division	$U ./ V$ (U and V are $m \times n$ matrices)
$.\backslash$	Element-wise left division	$U .\backslash V$ (U and V are $m \times n$ matrices) is equivalent to $(1/U) .* V$
$.^$	Element-wise power	$U .^ V$ (U and V are $m \times n$ matrices)



Note

An Element-wise operator performs an operation on each pair of Elements, which is in the same location, of the operand matrices.

Assignment operators

Operator	Operator name	Syntax
$=$	Assignment	$x=y$ $a=b$ $U=V$

Comparison operators

Operator	Operator name	Syntax
>	Greater	$x>y$ $U>V$
<	Less	$x<y$ $U<V$
\geq	Greater or Equal	$x\geq y$ $U\geq V$
\leq	Less or Equal	$x\leq y$ $U\leq V$
$=$	Equality	$x==y$ $a==b$ $U==V$
\neq	Inequality	$x!=y$ $a!=b$ $U!=V$



All comparison operators operate Element-wise on matrices in the example as follows

```
A = [1; 2; 3]
B = [3; 2; 1]
```

Then

```
A>B is [false; false; true];
```

Boolean operators

Operator	Operator Name	Syntax
!	NOT	$!A$
NOT		$\text{NOT } A$
not		$\text{not } A$
&	AND	$A \& B$
AND		$A \text{ AND } B$
and		$A \text{ and } B$
	OR	$A B$
OR		$A \text{ OR } B$
or		$A \text{ or } B$
\wedge	XOR (exclusive OR)	$A \wedge B$
XOR		$A \text{ XOR } B$
xor		$A \text{ xor } B$



Important

All boolean operators operate element-wise on matrices in the example as follows

```
A = [true; true; false; false];
B = [true; false; true; false];
```

Then

```
A&B is [true; false; false; false];
```