Matlab/Freemat/Octave/Scilab: Relational and Logical Operators

Relational operators in logical statements are used control the flow of code. In this document we simply consider the coding and results of relational operators. Logical statements cane be linked together using logical operators.

Relational Operators

The following table lists the relational operators in Matlab/Freemat and their meaning.

Relational operator	Mathematical notation	Matlab/Freemat/Octave/Scilab
Equal to	=	==
Greater than	>	>
Greater than or equal to	≥	>=
Less than	<	<
Less than or equal to	≤	<=
Not equal to	≠	~=

A logical statement can be evaluated to either true or false. In Matlab/Freemat/Octave/Scilab true is denoted by a '1' and false is denoted by a '0'. The following Matlab/Freemat/Octave/Scilab codes compare 2 to 2 and 2 to 3 to demonstrate the relational and logical operators.

```
--> 2==2
ans =
1
--> 2>2
ans =
0
--> 2>=2
ans =
1
--> 2<2
ans =
0
--> 2<=2
ans =
1
--> 2~=2
ans =
0
```

```
--> 2==3
ans =
0
--> 2>3
ans =
0
--> 2>=3
ans =
0
--> 2<3
ans =
1
--> 2<=3
ans =
1
--> 2~=3
ans =
1
```

Logical Operators

Logical operators act on or link logical statements to form new logical statements. There is one unary (meaning that it acts on only one operand) logical operator - NOT. The two main binary (meaning that it acts on two operands) logical operators – AND and OR.

<u>NOT</u>

If an operand evaluates to true (1) or false (0) the operator NOT has the following effect.

operand	NOT operand
1	0
0	1

In Matlab/Freemat the NOT operator is represented by a tilde (~).

```
--> ~1
ans =
0
--> ~0
ans =
1
```

<u>AND</u>

If the two operands evaluate to true (1) or false (0) the operator AND has the following effect.

operand	operand	operand AND operand
1	1	1
1	0	0
0	1	0
0	0	0

In Matlab/Freemat the AND operator is represented by an ampersand (&).

```
--> 1&1
ans =
1
--> 1&0
ans =
0
--> 0&1
ans =
0
--> 0&0
ans =
0
```

<u>OR</u>

If the two operands evaluate to true (1) or false (0) the operator OR has the following effect.

operand	operand	operand OR operand
1	1	1
1	0	1
0	1	1
0	0	0

In Matlab/Freemat the OR operator is represented by a vertical line (|).

```
--> 1|1
ans =
1
--> 1|0
ans =
1
--> 0|1
ans =
1
--> 0|0
ans =
0
```

Array Comparisons

Arrays of numbers may be compared in Matlab/Freemat/Octave/Scilab. The result is an array of 1s and 0s; the result of an element-by-element comparison. Note that the arrays must be of the same dimensions.

```
--> a=[1 2 3]
a =
1 2 3
--> b=[3 2 1]
b =
3 2 1
--> a==b
ans =
0 1 0
```

String Comparisons

String comparisons work in the same way as array comparisons. Each character of the strings are compared one-by-one. There are a range of other string functions[1] in Matlab/Freemat/Octave/Scilab.

```
--> x='abc'
x =
abc
--> y='cba'
y =
cba
--> x==y
ans =
0 1 0
```

---

[1] String functions