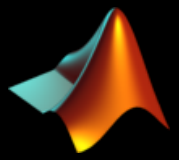

Programming with MATLAB

Logicals

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True or false?

You can *ask* Matlab whether an expression is true or false

```
1 == 1    % this will return 1 (true) because indeed one is the same as one
1 == 5    % this will return 0 (false) because one is NOT the same as five
1 ~= 5    % this will return 1 because indeed one is NOT the same as five

4 == 20/5      % this will return 1 (true) because 4 is the same as 20/5
5+5 == 10      % this will return 1 (true) because 5+5 is the same as 10
11 == 5+7      % this will return 0 (false) because 11 is NOT the same as 5+7
```

Assign the logical true/false in a variable

```
var1 = 4 == 4    % this will assign the value 1 (true) in var1
var2 = 4 == 5    % this will assign the value 0 (false) in var2
```

True or false?

```
myage = 30          % assign a numeric value of 30 to variable myage
myage == 30         % ask whether myage is the same as 30 (true)
myage == 5 * 6      % ask whether myage is the same as 5*6 (30; true)
myage == 5 * 6 + 1          % ask whether myage is the same as 5*6 + 1 (31; false)
```

True or false?

Create the following vector

temperature = [22 21 19 20 24 26 29 23]

```
temperature == 22        % will return an array of 8 elements (as many as
                         the length of temperature) with ones and zeros
                         at index positions that fulfill or not the
                         required condition (of being the same as 22)

temperature == 21        % similarly to above but the condition is now 21
temperature > 28
temperature < 20
temperature <= 20
```

True or false?

temperature >= 21 & temperature < 24

% indices with temperature greater or equal to 21 AND with temperature smaller than 24 will be assigned as true (1), the others as false (0)

NOTE

A temperature value of 24 is indeed greater than 21 BUT it is NOT smaller than 24, so it will be assigned as false!

temperature ~= 22

% indices with temperature ***different*** than 22 will be assigned as true (1)

Find an element in your array

Use the function *find* to find the index position of an element of your array that fulfills a condition

find(temperature > 20)
% will return the **index positions** of the array *temperature* that have a value > 20

find(temperature > 24 & temperature < 26)
% will return the index positions of the array *temperature* that have a value that is ***both*** > 24 ***and*** < 26

find(temperature > 24 & temperature < 26, 1)
% will return the ***first*** index position of the array temperature that has a value that is ***both*** > 24 ***and*** < 26

Find an element in your array

```
find(temperature == 21 | temperature == 22)
% will return the index positions of the array temperature that have a value either
equal to 21 or equal to 22

find(temperature >= 22 & temperature <= 26 | temperature == 29)
% will return the index positions of the array temperature that
a) have a value that is both greater or equal to 22 and smaller or equal to 26, OR
b) have a value of 29
```

Note

The logical AND has priority over the logical OR
MATLAB will group the statements connected with AND,
before executing the statements in the OR

Find an element in your array

Create the following 10 x 2 matrix

```
matrix = [ (1:10)', randi([1 3], 10, 1)

cond2 = find(matrix(:, 2) == 2)
% will return the index positions of column 2 where the element has the value of 2

cond3 = find(matrix(:, 2) == 3)
% will return the index positions of column 2 where the element has the value of 3

cond = find(matrix == 3)
% will return the linear index positions of matrix with elements == 3
% recall linear indexing
```

Find an element in your array

Create the following 1 x 8 string matrix
teammates = [“Nick”, “Tom”, “Sophie”, “Lena”, “Elena”, “Nicky”]

Use the function *strcmp* to compare the elements of your array with a ‘test’ string

find(strcmp(teammates, ‘Tom’))
% will return the value of 2, because it is the first element of your array *teammates* that is the same as the test string ‘Tom’

find(strcmp(teammates, ‘Lena’))
% will return the value of 4, because it is the eighth element of your array *teammates* that is the same as the test string ‘Lena’

Find an element in your array

find(strcmp(teammates, ‘lena’))
% will return an empty array because none of your elements is the same as ‘lena’
% (note that ‘l’ is lower-case!)

Look up the functions:
find
strcmp
strfind
and
or
…and the associated *help* pages about **logical operations**

That’s all