TECHNISCHE UNIVERSITÄT DRESDEN

Introduction to Matlab

Conditionals and loops

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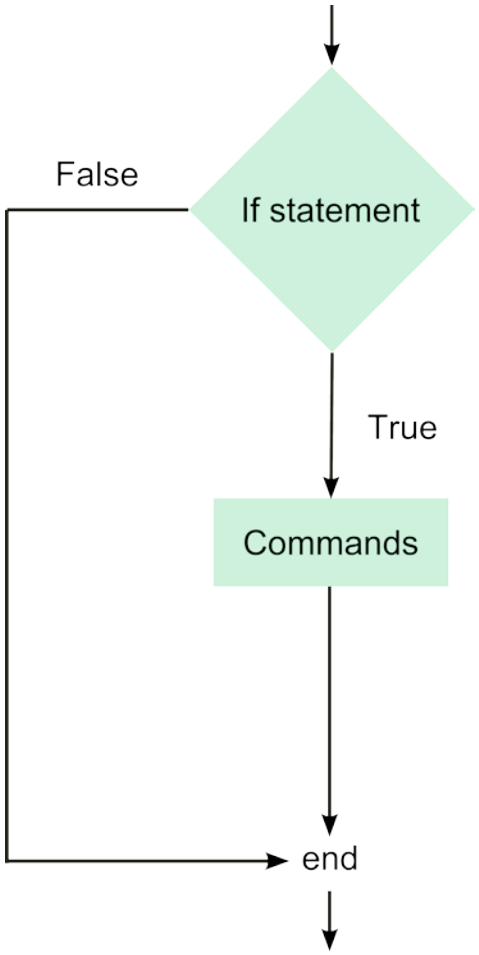
DRESDEN concept
Exzellenz aus Wissenschaft und Kultur

Exercises

1. Create a function called MyConcatenation, that takes as input two matrices. It should concatenate these two matrices one next to the other, in the order they are given. Additionally, these two lines of code should be included:
   figure
   imagesc(x)
   where x is the result of the concatenation. The function should also output X. The input matrices for the function should be:
   A = ones(5,1), B = magic(5)
2. Using MyConcatenation, concatenate the output of the previous exercise with a matrix C = zeros(5,1).
3. Write a function MyElimination that removes the last 3 columns of the output of the last exercise
4. Write a script that runs the last 3 exercises together.

If conditionals

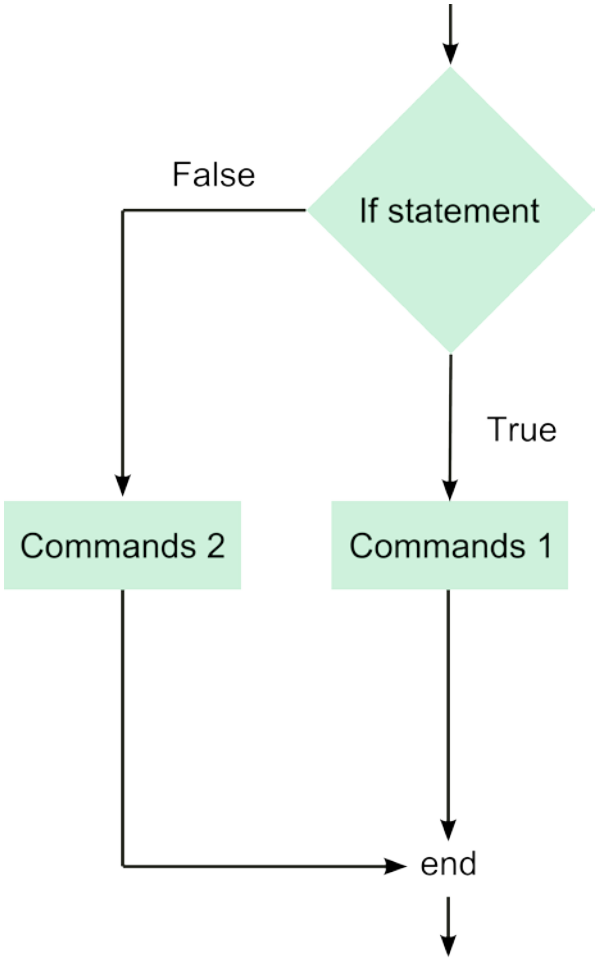


if conditional
commands
end

Example:

If a<5
fprintf('a is smaller than 5');
end

If else

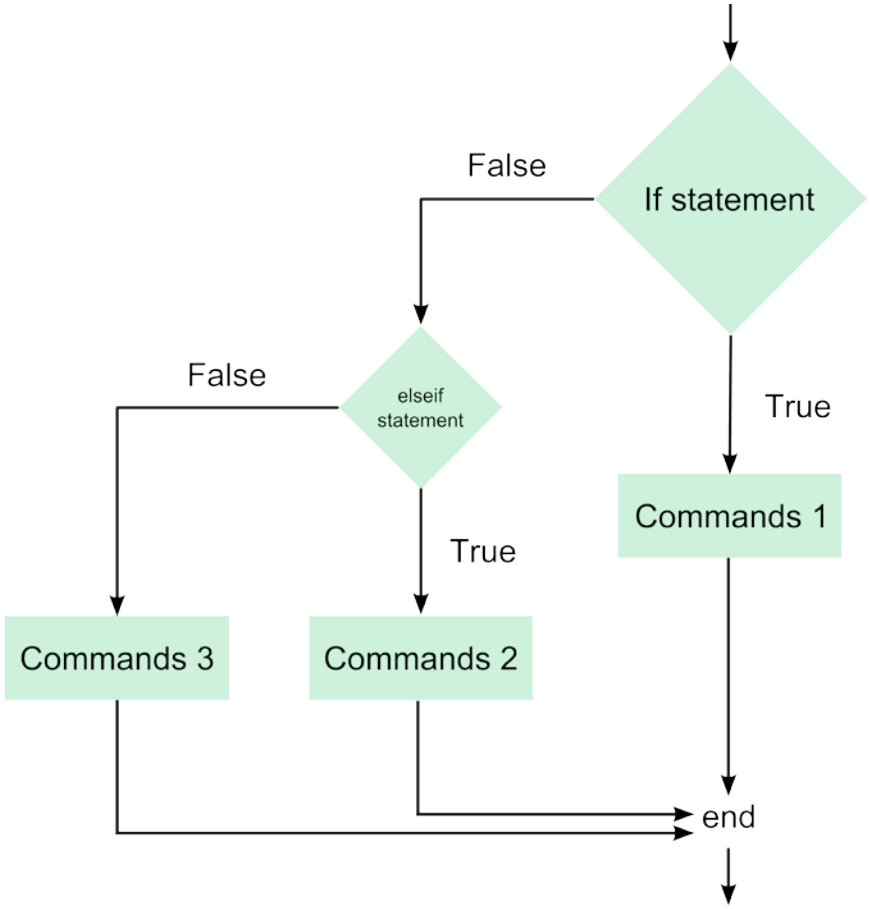



```
if conditional
commands
else
commands
end
```

Example:

```
if a<5
fprintf('a is smaller than 5');
else
fprintf('a is bigger or equal
than 5');
end
```

If elseif



if conditional
commands
elseif
commands
end

Example:

```
if a<5
fprintf('a is smaller than 5');
elseif a>5
fprintf('a is bigger than 5');
else
fprintf('a is 5');
end
```

Conditionals

There are many conditionals you can use with the if statement:

- <
- >
- ==
- <=
- >=
- ~=
- 0
- 1

There are combination operators:

- && (and)
- || (or)
- ~ (negation)

If it is True, it will return 1. If it is False, it returns 0. For example:

1<3 → 1
8>9 → 0
5 ==5 → 1
~(1>2) → 1
~6 → 0

1 && 1 → 1
1 && 0 → 0
0 && 1 → 0
0 && 0 → 0

1 || 1 → 1
1 || 0 → 1
0 || 1 → 1
0 || 0 → 0

Switch and case

```
switch x
case value1
commands
case value2
commands
…
otherwise
commands
end
```

Example:

```
switch x
   case 1
     y = 2;
     x = 2;
   case 2
     y = -2;
   case {3,4}
     y = 9;
   otherwise
     y = 0;
end
```

for loop

To repeat a block of commands many times, use a for loop.

```
for index = values
commands
end
```

For example:

```
for k = 1:3
  display(k)
end
```

Example:

```
for k = [1,5,-1]
   display(k)
end
```

Examples

```
for x = 1:10
   if x==5 || x== 7
      display(x);
   end
end
```

```
for k = 1:10
   y(k) = exp(k);
   if y(k)>30
      y(k) = 30;
   end
end
```

```
gamma = 1;
x = 5;
for i = 1:x
   gamma = gamma*i;
end
```

Exercises

1. Using for loops, calculate the volumes of cilinders whose radii are r = {1,1.2,1.3} and whose height is h = 5. That is, calculate three volumes (one for each cilinder). Write these volumes to a vector VolumesCilinder. The volume of a cilinder is given by $V = \pi r^2 h$.
2. Repeat the previous exercise, but now with r = {1, 1.2, 1.3} and h = {5, 10, 12}. Write the results to a 3x3 matrix. Hint: use two nested for loops.
3. Write a function with two inputs, a vector VecX and a number Y. The function should search VecX and find those elements that equal X. The output of the function is a vector Z with those indices. The function must work with any size of vector VecX.