

WESTERN SYDNEY
UNIVERSITY



Module 5

For Loops

Repetition Structures

- We use “loops” to repeat a set of instructions multiple times
- MATLAB supports two types of loops
 - `for` loops
 - `while` loops

Concept of the for loop

- The **for** loop is a MATLAB construct that allows a sequence of MATLAB statements to be executed more than once
- The **for** loop repeats a block of commands for a specified number of times; the specified number is established before the loop is executed.

Construction of **for** loops

□ The **for** loop construct:

```
for index = [range of values in array format]  
    command #1  
    command #2  
    command #3  
    ...  
end
```

- The loop is executed once for each element of the index matrix identified in the first line

for loop example 1

```
for_ex1.m x +
1 % for loop example 1
2 for k=[1 2 7 10] % 4-element array is the index array
3     k % displays k in each iteration
4 end
```

script Ln 4 Col 4

```
Command Window
>> for_ex1
k =
    1
k =
    2
k =
    7
k =
   10
fx >> |
```

for loop example 2

```
for n = 1:5
    fprintf('The value of n is now %d\n',n);
end
```

- **The output should look like:**

The value of n is now 1

The value of n is now 2

The value of n is now 3

The value of n is now 4

The value of n is now 5

Note: After executing this script, change the steps `n = 1:5` to `n = 1:0.5:5` and execute the script to show that `n` does not have to be an integer.

Exercise

You can use a loop to define, element by element, a vector; this illustrates how a for loop works. Try the following exercise:

```
for n=1:5
    fprintf('The value of n is now %d\n',n);
    vector_1(n)=n;
    vector_2(n)=n^2;
end
```

- **vector_1** contains the values of n, i.e.:
`vector_1 = [1 2 3 4 5]`
- **vector_2** contains the squares of n, i.e.:
`vector_2 = [1 4 9 16 25]`

Let us create a conversion chart

- Degrees-to-Radians
 - Create a table that converts angles from degrees to radians, from 0 to 360 degrees in increments of 10 degrees.
- Inputs and Outputs
 - Input: Define an array of angles in degrees.
 - Output: Display a table of angles in degrees and the corresponding values in radians

The conversion table code

```
fprintf('Degrees to Radians\n')
fprintf('Degrees      Radians\n')

for degrees = 0:10:360
    radians = (pi./180).* (degrees);
    fprintf('%8.0f   %8.2f \n', degrees, radians)
end
```

the function `deg2rad()` can be used instead

Exercise

- Create a table that illustrates the relationship between temperature in degrees Celsius and the corresponding temperature in degrees Fahrenheit, from -40 to 100 degrees C in increments of 5 degrees. The conversion formula is as follows:

$$F = \frac{9}{5} C + 32$$

- Check the temperatures that we all may know the conversion, e.g., 0 C = 32 F, and 100 C = 212 F.