Computer II (MATLAB)

الحاسوب 2

2025-2024

Lecture 5

by

Dr. Ahmed Hasan Al-Janabi

Ahmed.janabi@uomus.edu.iq

Learning Objectives

- Understand how to use the **mod** function for modular arithmetic
- Uses of **isempty** to check for empty arrays or variables.
- Understand how to use **for** loops to repeat operations in MATLAB.
- Understand the purpose and structure of **while** loops in MATLAB.

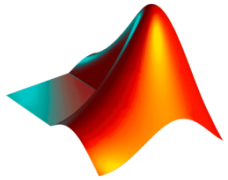
The mod Function

- Purpose: Calculates the remainder of a division operation.
- Syntax:

```
result = mod(a, b);
```

- Parameters:
  - a: Dividend
  - b: Divisor
- Example:

```
mod(10, 3)  % Returns 1 (remainder of 10/3)
```



Common Uses of the mod Function

- Even or Odd Check:
- To check if a number is even:

```
mod(n, 2) == 0
```

- Example:

```
n = 5;
if mod(n, 2) == 0
    disp('n is even');
else
    disp('n is odd');
end
```

MATLAB®

Practical Examples of mod

- Example 1: Find numbers divisible by 3 in a vector.

```
A = [1, 2, 3, 4, 5, 6];
divisibleBy3 = A(mod(A, 3) == 0);  % Returns [3 6]
```

- Example 2: Display every third element in a vector:

```
A = [10, 20, 30, 40, 50, 60];
for i = 1:length(A)
    if mod(i, 3) == 0
        disp(A(i));
    end
end
```

MATLAB®

The isempty Function

- Purpose: Checks if a variable or array is empty.
- Syntax:

```
result = isempty(variable);
```

- Returns: true if variable is empty, false otherwise.
- Example:

```
B = [];
isempty(B)  % Returns true
```

Common Uses of isempty

- Check if Arrays Are Empty:
  - Use in conditional statements to avoid errors in code execution.
- Validation Before Operations:
  - Ensures variables have data before performing calculations.
- Example:

```
values = [];
if isempty(values)
    disp('No values to process');
else
    disp( values(0) );
end
```

Understanding for Loops

- Definition: A for loop repeats a block of code a specified number of times.
- Usage: Ideal for iterating over arrays, performing calculations repeatedly, and automating repetitive tasks.
- Basic Structure:

```
for index = start:step:end
    % Code to execute
end
```

Basic Syntax of a for Loop

- Structure:

```
for i = 1:5
    disp(i);  % Displays values from 1 to 5
end
```

- Explanation:
  - `i = 1:5` sets the loop to run from 1 to 5, incrementing by 1 each time.
  - Inside the loop, `disp(i)` displays the current value of i.

Using Custom Step Sizes

- Syntax: Define step sizes by specifying start:step:end.
- Example:

```
for j = 1:2:10
    disp(j);  % Displays odd numbers from 1 to 9
end
```

- Explanation: The loop starts at 1, increments by 2 each time, and stops at 10.

MATLAB®

Practice Exercise

- Task 1: Create a for loop to display the square of numbers from 1 to 10.
- Task 2: Create a nested for loop to print the multiplication table up to 5x5.

Let’s try MATLAB

Launch MATLAB and work towards the exercises