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Lecture No.: 5

Lecture Title: [The mod Function]





Computer II (MATLAB)

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Lecture 5

by

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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
```





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
```





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.



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

