Introduction to Computer for Engineers

Lecture 4
Logical Operators and Conditional Statements

Dr. Vo Tan Phuoc
School of Electrical Engineer – International University

Programming in Matlab

Motivation example: Pi number approximation

- **Decouple or split the approximation equation in many smaller steps**
- **Transfer one output to another input in order to obtain the final result**
- **Execution order**

Programming in MATLAB

Motivation example: 2nd order polynomial equation – need different "program"/script for

- **Case no root**
- **Case 1 multiple root**
- **Case 2 distinct roots**

Programming in MATLAB

Motivation example: 2^{nd} order polynomial equation

How to build Only one script that runs in all cases no matter what the value of delta is ?

Programming in MATLAB

Instructions in script are executed from TOP to BOTTOM

<u>We always can</u>

- **Skip some instructions in script**
- **Different instruct. are executed in diff. runs**
- **Repeat one or many instruct. many times**

Programming in MATLAB

Instructions in script are executed from TOP to BOTTOM

<u>We always can</u>

- **Skip some instructions in script**
- **Different instruct. are executed in diff. runs**
- **Repeat one or many instruct. many times**

Logical op. & conditional statement

Relational Operators

Relational Op.	Meaning
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
==	Equal to
~=	Not equal to

Relational Operators

Usage:

- **Compare 2 numbers in 1 “statement”**
- **If the statement is TRUE (correct) , return 1**
- **IF the statement is FALSE (wrong), return 0**

Relational Operators

Demonstration: Observe the answer in the command window – explain why ?

```
>> 5 > 8

>> a = 5 < 10

>> b = (6 < 10) + (7<8) + (5*3 == 60/4)
```

Logical Operators

- **Statement ? Example of statement**
- **The value of a statement should be in TRUE or FALSE**
- **MATLAB "says"**
  NON-ZERO number is TRUE
  ZERO is FALSE

Logical Operators

Logical Operators	Meaning
&	AND
|	OR
~	NOT

X and Y are two statements ?

Depending on the type of operators

X (logical operation) Y = TRUE/FALSE

Logical Operators

Logical Operators	Meaning
&	AND
|	OR
~	NOT

X and Y are two statements ?

Conditional Expression

Depending on the type of operators

X (logical operation) Y = TRUE/FALSE

Logical Operators

Demonstration: observe the following statement in command in window and explain why ?

```
>> 3 & 7

>> a = 50|0

>> x = -2; -5 < x < -1

>> x=-2; -5 < x & x < -1
```

Logical Operators

Demonstration: observe the following statement in command in window and explain why ?

```
>> 3 & 7

>> a = 50|0

>> x = -2; -5 < x < -1

>> x=-2; -5 < x & x < -1
```

Conditional Expression

Conditional Statement

THE FORM OF A CONDITIONAL STATEMENT

```
if   Conditional expression
```

consisting of relational and/or logical operators

Examples:

```
if   a < b
if   c >= 5
if   a == b
if   a ~= 0
if  (d<h)&(x>7)
if  (x~=13)|(y<0)
```

All variables must have assigned values.

IF statement

THREE FORMS OF THE `if` STATEMENT

1

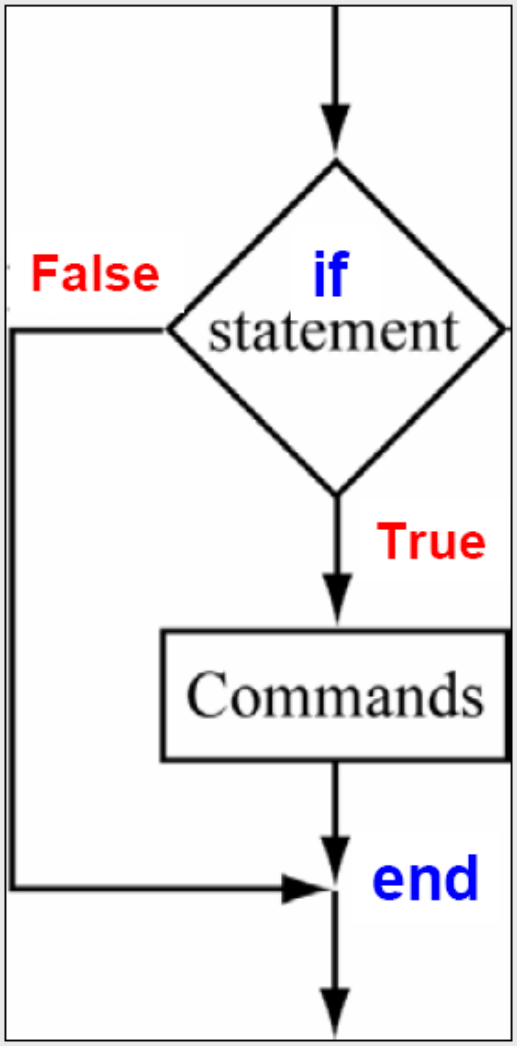
```
If  conditional statement
        commands
end
```

```
if  conditional statement
      command group 1
else
      command group 2
end
```

```
if  conditional statement 1
        command group 1
elseif  conditional statement 2
        command group 2
else
        command group 3
end
```

IF Statement

THE `if-end` STATEMENT




```
.....
.....        MATLAB program.
.....
if  conditional expression
        .....
        .....    A group of MATLAB
        .....    commands.
end
.....
.....        MATLAB program.
.....
```

Solving an "Engineering Problem"

- **Check your knowledge about problem (Problem formulation, Problem definition …)**
- **Problem requirement(s)/specification(s)?**
- **Any idea to solve it? Planning ?**

Solving an “Engineering Problem”

- **Planning should be careful investigated write in paper, use PC (excel/word) or SW**
- **Planning should be written in details**
- **Natural language -> Programming Language**

End of Lecture 4