



Elective Course - 4th year

**New Programming Language
(MATLAB)**

Control Statements

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Lecture Outlines

☐ Control Statements:

1. Loop Statements

FOR Loop Statement

WHILE Loop Statement

2. Conditional Statements

IF –ELSE Statement

SWITCH Statement

☐ Input/output Commands:

Pause
fprintf

Keyboard
break

input
error

disp

☐ Matlab Function design and Exercise.

MATLAB Operators

➤ Relational Operators:

Operator	Description
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to
==	Equal to
~=	Not equal to

➤ Logical Operators:

Logical Operation	Equivalent Function
A & B	and(A, B)
A B	or(A, B)
~A	not(A)

Loop Statements

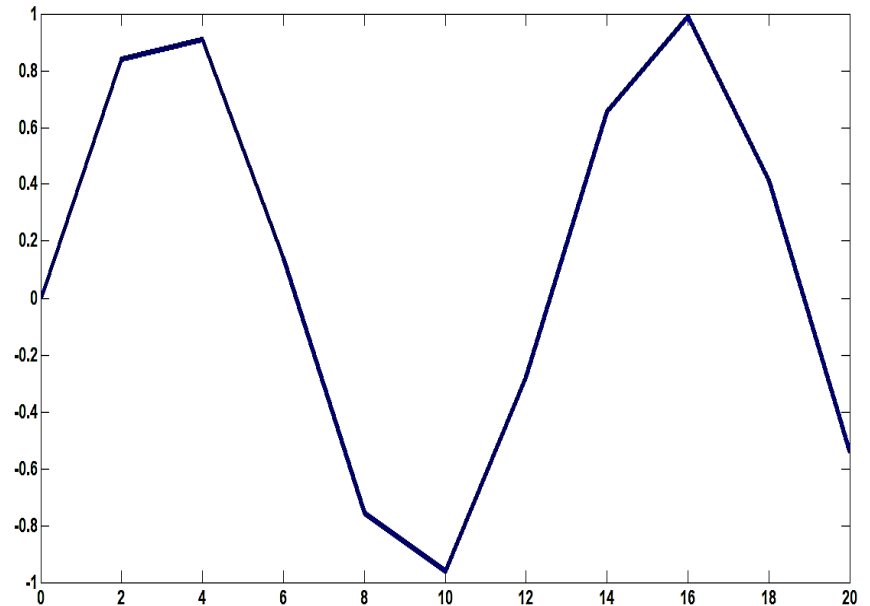
FOR-Loop Statement:

Syntax:

```
for index=start : increment : end
    statements;
end
```

Example:

```
for i = 0 : 10
    x(i+1) = 2*i;
    y(i+1) = sin(i);
end
plot(x,y)
```



Loop Statements

☐ WHILE-Loop Statement:

Syntax:

```
while expression  
    statements;  
end
```

Example:

```
n=0;  
while 2^n < 10  
    n=n+1;  
end
```



Conditional Statements

□ IF-ELSE Statement:

Syntax1:

```
if expression
    statements;
end
```

Syntax2:

```
if expression
    statements1;
else
    statements2;
end
```

Syntax3:

```
if expression 1
    statements1;
elseif expression2
    statements2;
elseif expression3
    statements3;
...
else
    statementsn;
end
```

Conditional Statements

Example:

3-bit A/D converter with analog input X and digital output Y represented as:

$Y = 0$	$X < -2.5$
$= 1$	$-2.5 \leq X < -1.5$
$= 2$	$-1.5 \leq X < -0.5$
$= 3$	$-0.5 \leq X < 0.5$
$= 4$	$0.5 \leq X < 1.5$
$= 5$	$1.5 \leq X < 2.5$
$= 6$	$2.5 \leq X < 3.5$
$= 7$	$X \geq 3.5$

Solution:

```
function Y_dig=A2D(X)
%A2D performs 3-bit ADC with
%analog I/p X and digital O/p Y
if X<-2.5
    Y_dig=0
elseif (X>=-2.5)&(X<-1.5)
    Y_dig=1
elseif (X>=-1.5)&(X<-0.5)
    Y_dig=2
    ...
else
    Y_dig=7
end
```



Conditional Statements

□ SWITCH-CASE Statement:

Syntax:

```
switch expression (scalar or string)
  case value1
    statement1;
  case value2
    statement2;
  ...
  otherwise
    statementn,
end
```


Conditional Statements

X	Y
0.1	0.5
0.2	0.88
0.5	1.1
0.75	3.12
others	0

Solution:

```
switch X
    case 0.1
        Y=0.5;
    case 0.2
        Y=0.88;
    case 0.5
        Y=1.1;
    case 0.75
        Y=3.12;
    otherwise
        Y=0;
end
```



Input/output Commands

pause

:halt execution temporarily i.e. causes the currently executing M-file to stop and wait for you to press any key before continuing.

keyboard

:halt execution and terminate the control to input from keyboard to end keyboard mode type **"return"** command.

input

:To request user input as:

```
user_name = input(' Enter your name: ')
```



Input/output Commands

disp (x) : Display the variable x value without printing the variable name.

disp ('text') : Display 'text' on the screen.

fprintf (format,data) : used to print both text (e.g. variable name) and variable value.

```
>> fprintf( 'Result is %d' , 3 )
```

```
Result is 3
```

```
>> fprintf( 'Area of a circle with radius %d is %f', 3, pi*3^2 )
```

```
Area of a circle with radius 3 is 28.274334
```



Input/output Commands

break : Terminates execution of **for** or **while** loop.

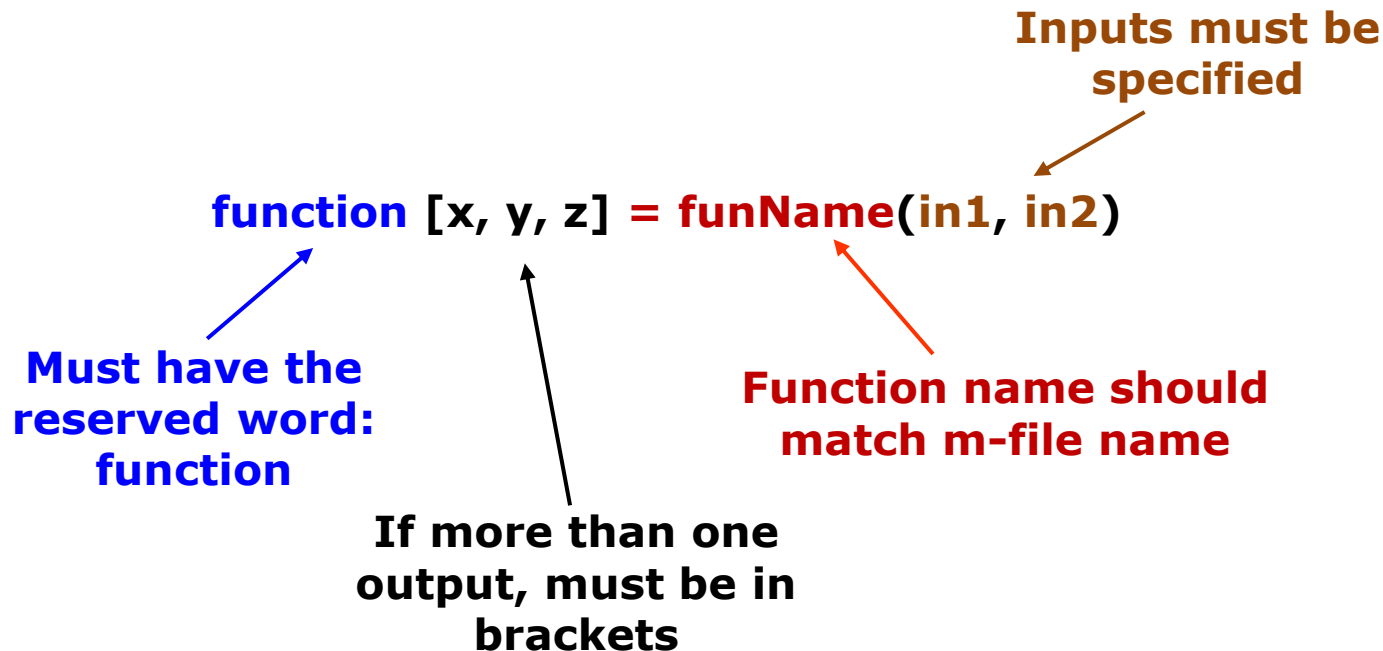
error : Display user error defined message and abort function.

```
x = input(' Enter age of student : ')  
if x<0  
    error( 'Wrong age is entered, try again' )  
end
```

MATLAB Function Design

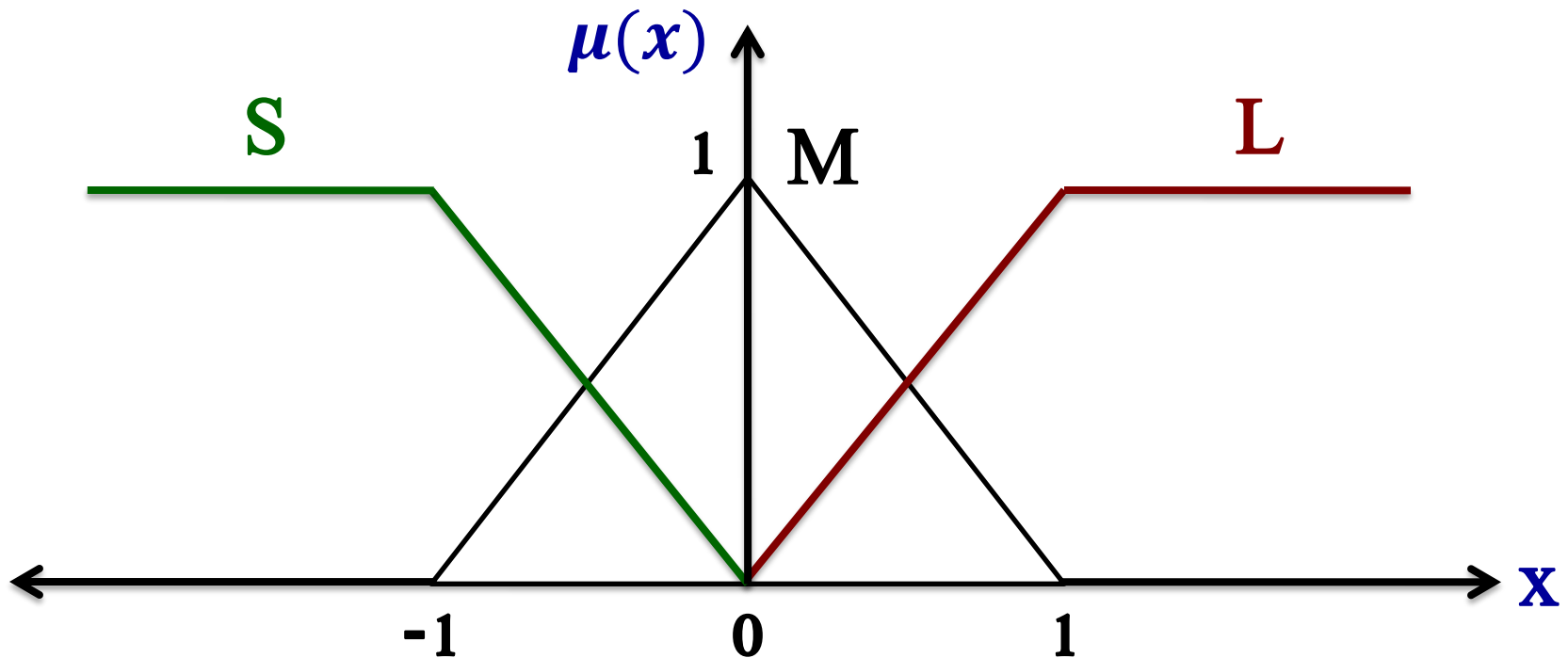
■ User-defined functions design steps:

1. From Menu bar select File→New→Function or open a new m-file editor.
2. Define Function m-file declaration line as:



Exercise

➤ Design a MATLAB function to calculate the membership values S , M and L for a given input x for the following represented membership function:



Solution

```
function [S, M, L] = fuzz(x)
%fuzz function used to evaluate the inference of the membership function.
%[small,medium,large]=fuzz(x)
if(x<-1)
    S=1;
    M=0;
    L=0;
elseif(x>=-1)&(x<0)
    S=-x;
    M=x+1;
    L=0;
elseif(x>=0)&(x<1)
    S=0;
    M=-x+1;
    L=x;
else
    S=0;
    M=0;
    L=1;
end
```


Questions and Discussion

