Functions & Conditions & Looping in MATLAB

Section 3
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Agenda

01

Input Command

Input command:

input(*user message*)

Displays the text in prompt and waits for the user to input a value and press the Return key.

Numeric Input:

X = input ('User message');

For Example:

       x = input ('Enter the value of X :');

       y = x * 10

```
x  =
       42

y  =
      420
```

String Input:

X = input ('User message', 's');

For Example:

```
message = input('Please, Enter your name : ', 's');
message

>> untitled
Please, Enter your name : Dalia Tarek

message =

    'Dalia Tarek'
```

02

Output Commands

disp command:

The *disp* command displays the elements of a variable without displaying the name of the variable and displays text.

For Example:

>>A = [1 2 3 ; 4 5 6];
>> disp(A)
      1 2 3
      4 5 6
>> disp('Solution to the problem.')
          Solution to the problem.

disp command:

Concatenate multiple character vectors together using the [] operator.

For Example:

>>A = [1 2];
>> disp(['Values :' , A])

Values : 1 2

The *fprintf* command:

The **fprintf** command displays output (text and data) on the screen or saves it to a file. The output can be formatted using this command.

For Example:

```
>>name = 'Alice';
>>age = 12;
>>fprintf('%s will be %d this year.\n',name,age);
```
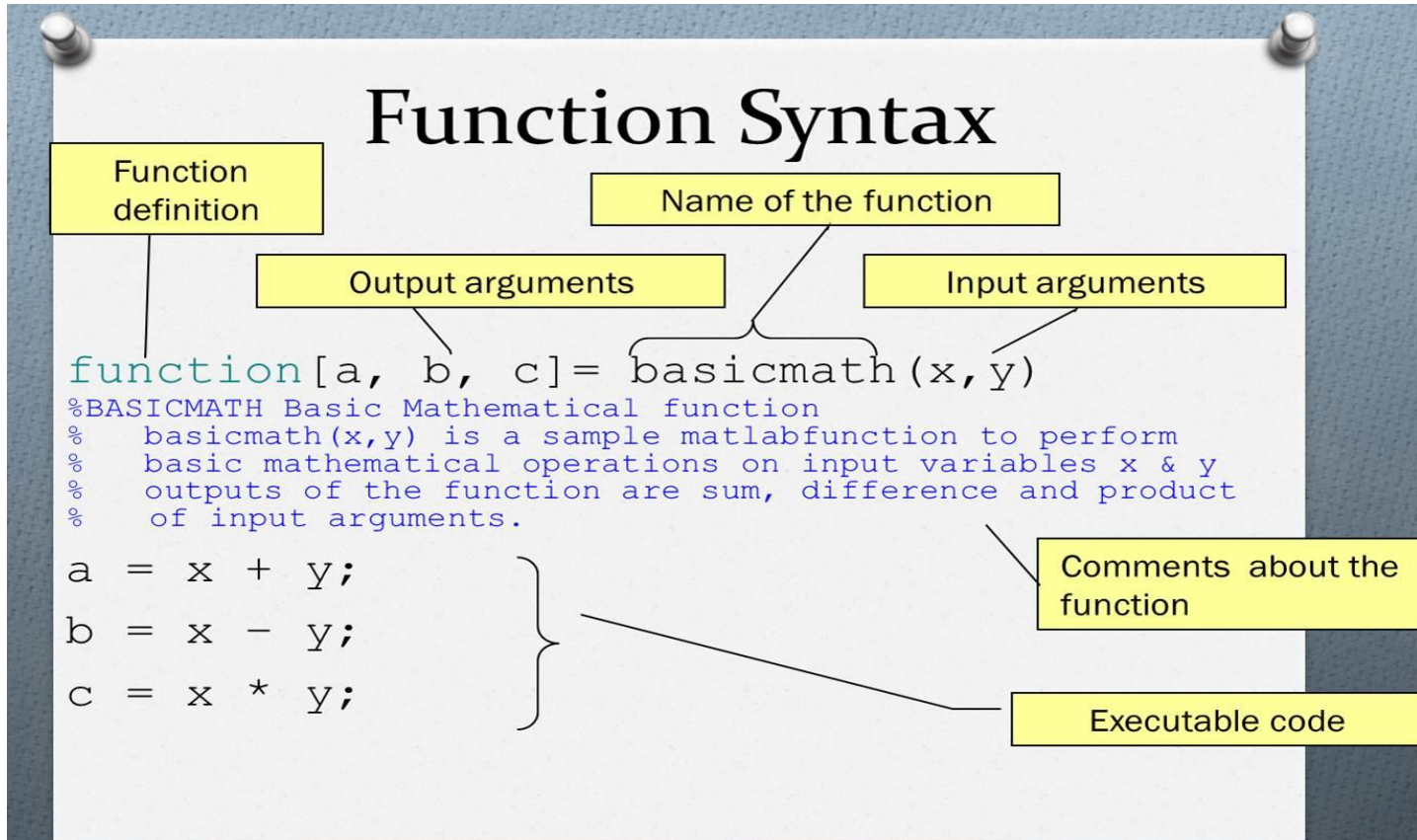
Alice will be 12 this year

01

Functions

Functions:

Function Syntax

Function definition

Name of the function

Output arguments

Input arguments

```
function [a, b, c]= basicmath (x,y)
%BASICMATH Basic Mathematical function
%    basicmath(x,y) is a sample matlabfunction to perform
%    basic mathematical operations on input variables x & y
%    outputs of the function are sum, difference and product
%    of input arguments.

a = x + y;

b = x - y;

c = x * y;
```

Comments about the function

Executable code

Example 1:

Define a function in a file named stat.m that returns the mean and standard deviation of an input vector.

Answer:

```matlab
function [m,s] = task1(x)
    n = length(x);
    m = sum(x)/n;
    s = sqrt(sum((x-m).^2/n));
end
```

Command Window

New to MATLAB? See resources for Getting Started.

```
>> values = [12.7, 45.4, 98.9, 26.6, 53.1];
>> [ave,stdev] = task1(values)

ave =

   47.3400


stdev =

   29.4124

>>
```

Example 2:

Define a function in a file named area.m that returns the area of square or rectangle as user choose.

Answer:

```
function [ fobj] = area (type, w, l)
    if type == 's'
        fobj =  square(w);
    else
        fobj =  rectangle(w,l);
    end
    x= w;
    y= l;
end
```

Answer:

```
function o= square (x)
        o= x*x;
end
function o= rectangle(x,y)
        o= x*y;
end
```

Answer:

```
>> shape = input('Please, Enter the type of shape:','s');
Please, Enter the type of shape:s
>> fprintf ('The square area = %f', area(shape, 2,3));
The square area = 4.000000>>
```

02

Relational and Logical Operators

Relational operators:

Relational Operators	Description
<	Less than
<=	Less than or equal
>	Greater than
>=	Greater than or equal
==	Equal
~=	Not equal

Logical operators:

Logical Operators	Description
&&	and
||	or
~	not

Logical operators functions:

Logical Operators	Description
and(X,Y)	and
or(X,Y)	or
not(X)	not
all(A)	>>A = [5 3 11 7 8 15] >>all(A) ans = 1

Logical operators functions:

Logical Operators	Description
any(A)	>>A = [5 0 14 0 0 13] >>any(A) ans = 1
find(A)	>>A = [0 7 4 2 8 0 0 3 9] >>find(A) ans = 2 3 4 5 8 9
find(A>d)	>>find(A > 4) ans = 4 5 6

03

Conditional Statement

If Condition:

An **if** statement can be followed by one (or more) optional **elseif...**

An **else** statement, which is very useful to test various conditions.

If Condition:

if <expression 1>
    % Executes when the expression 1 is true
    <statement(s)>

elseif <expression 2>
    % Executes when the boolean expression 2 is true
    <statement(s)>

else
    % executes when the none of the above condition
is true
    <statement(s)>
end

Example 1:

Write a program to accept two numbers from user then print the greatest number.

Answer:

```matlab
a = input ("please, enter number 1 :");
b = input ("please, enter number 2 :");
if (a>b)
    disp(" a is the greatest number !!!")
elseif (b> a)
     disp(" b is the greatest number !!!")
else
    disp(" two numbers are equal")
end
```

```
>> task1
please, enter number 1 :3
please, enter number 2 :6
 b is the greatest number !!!
```

Example 2:

Write a program to make an array of 10 random numbers & user enter limit value between 0 t0 1
If any number in array greater than limit print
   'There is at least one value above the limit.'
Else
   'All values are below the limit.'

Answer:

```matlab
limit = input("Enter limit value between o & 1" );
A = rand(10,1);
if any(A > limit)
    disp('There is at least one value above the limit.')
else
    disp('All values are below the limit.')
end
```

```
>> untitled
Enter limit value between o & 1.6
There is at least one value above the limit.
>> |
```

05

Tasks

Task 1:

Define a function in a file named *Calculator.m* that returns the result of operation as user choose (+, -, *, /).

Task 2 :

Write a program to enter number & max-val & min-val then check if number falls within a specific range or not.

THANKS!