MA2252 Introduction to Computing

Lecture 6: Functions (contd.)

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Learning outcomes

At the end of lecture, students will be able to understand and create

- Subfunctions
- Function handles
- Script files

Subfunctions

A subfunction is a function defined under a parent/main function in the same .m file.

Subfunctions (contd.)

Example:

```
function [x1,x2] = myrootsfun(a,b,c)

%This function calculates roots of quadratic equation with
%coefficients a, b and c.
%Sharad
%28-09-2022

D = mydiscriminant(a,b,c);    %call the mydiscriminant subfunction
x1=(-b+sqrt(D))/(2*a);
x2=(-b-sqrt(D))/(2*a);

end
```

Subfunctions (contd.)

```
function [disc] = mydiscriminant(A,B,C)

%This subfunction calculates the discriminant D.

disc=B^2-4*A*C;

end
```

Subfunctions (contd.)

Note:

- Only parent function can call its subfunction.
- Subfunction retains a separate workspace from its parent function.

Subfunctions (contd.)

Demo

Activity

Consider again the subfunction mydiscriminant(A,B,C). What happens when you type

DISC=mydiscriminant(1,-7,10) in command window and hit 'Enter' ?

Let's do a mentimeter poll!

Activity (contd.)

Please go to the link https://www.menti.com/al9p1z6skq4f provided in chat

or

visit https://www.menti.com and enter the code **39701413**

Function handles

A function handle is a variable which stores some function.

Construction:

1. Using built-in functions: function_handle=@function_name

   Example: F=@sin

   Here, variable F is function handle which stores sine function.

Function handles (contd.)

2. Using anonymous function:

   function_handle=@(input variables) function_definition

   Examples:

   - reciprocal=@(x) 1/x
   - myimplicit=@(x,y) x+y+x*y
   - combinations=@(n,r) factorial(n)/(factorial(r)*factorial(n-r))

Function handles (contd.)

Demo

Function handles (contd.)

Using function handle to pass a function to other functions

Example:

```
function [y] = sumfun(f,g,x)

%This function calculates the sum f(x)+g(x) for any two given
%functions f and g.

y=f(x)+g(x);

end
```

Function handles (contd.)

Demo

Function handles (contd.)

Using Function Handles

Pros

1. To use function as a variable whenever needed.
2. No need to write a .m file to define your function.
3. To pass function as input to other functions.

Function handles (contd.)

Cons

1. Only works with functions with one output.
2. Only useful when your function has a simple definition.

Script files

Script file is a .m file where you write your code.

- To open a script file, click ‘New Script’ in HOME menu.
- To save, click ‘Save’ in EDITOR menu.
- To run the script file, click ‘Run’ in EDITOR menu.

Script files (contd.)

Example:

```
%This script file calculates the roots of a quadratic equation with
%coefficients a,b and c.
clc
clear all
a=1;
b=-7;
c=10;
D = b^2-4*a*c;     %calculate the discriminant D
x1=(-b+sqrt(D))/(2*a);     %calculate first root x1
x2=(-b-sqrt(D))/(2*a);     %calculate second root x2
```

Script files (contd.)

Demo

Script files (contd.)

Script files vs Functions

- Script files share their workspace with command window workspace. Functions have their own workspace.
- Script files are used for specific task. Functions are useful when the same task has to be done for different inputs.

End of Lecture 6

Please provide your feedback here