USC GSBME MATLAB CLASS

The third session

Reviewing previous session

Practice time!

A. Logical Statements

In logical statements, 1 stands for "True" and 0 stands for "False". Logical operators will operate on the logical values. Here we will discuss "**and(&)**, **or(|)**, **xor**, **not,** ==, >, <, >=, <=" operators.

Let's see how they work:

1 and 1 = 1	**1 or 1 = 1**	**1 xor 1 = 0**	**not 1 = 0**
1 and 0 = 0	**1 or 0 = 1**	**1 xor 0 = 1**	**not 0 = 1**
0 and 0 = 0	**0 or 0 = 0**	**0 xor 0 = 1**	

3>7 = 0	**2<5 = 1**	**3==3 = 1**
3>=3 =1	**4<=7 =1**	**5<=2 = 0**

Please note that MATLAB translate any number except zero as "True".

Example:

- 5 | 0 = 1

B. Loops and Conditional Statements

To create loops and conditional statements in MATLAB we use if, switch, for, continue, break, try-catch, return…
Here we will discuss some of the most important ones from this functions.

B.1. Conditional Statements

Here we will discuss if and switch conditional statements.

B.1.1. "if"

```
if expression
    statements
elseif expression
    statements
else
    statements
end
```

Example:

```
if 3>5
z=1
else
z=2
end

z =
     1
```

B.1.2. "switch"

```
switch switch_expression

   case case_expression
      statements
   case case_expression
```

```
        statements
    ...
    otherwise
        statements
end
```

Example:

```
switch z
case 1
z2=100
case 2
z2=200
end

z2 =
   200
```

Practice time!

- Define x, y and z as 1 and 2 and 3 respectively. Write a code using if that checks the z and if it is larger than 10, subtracts x from y. Otherwise, adds x and y.

B.2. Loops

Here we will discuss for and while loops.

B.2.1. "for"

```
for index = values
    statements
end
```

Example 1:

```
for i=1:10
    i % just show the value of i on the command window
end
```

Example 2:

```
a=0;
for i=1:5
    a=a+i
end
```

B.2.1. "while"

```
while expression
    statements
end
```

Example:

```
while j>0
   j=j-1
end
```

Practice time!

- Try to find the value of y which is described below, using for loop. (the answer would be 140)

$$y = \sum_{i=1}^{7} i^2$$

C. Symbolic variables in MATLAB

syms x y z t …

This command changes its variables (x y z t …) to symbolic variables that we can use as parameters.

Now, we can relate the variables. As an example:

Z=x+y^2

Try it yourself!

Now, if we want to validate this equation for known values for x and y we can type down the following command:

subs(z,{x,y},{1 2})

It is equivalent to: $z = x + y^2 = 1 + 2^2 = 5$

Also, to integrate and differentiate symbolic statements we can use **int** and **diff** commands respectively.

Example 1:

Int(z,y)

Try it yourself!

Example 2:

diff(z,y)

Try it yourself!

D. 3D Plotting

In this part we will discuss two different functions for plotting data in a three dimentional environment.

D.1 plot 3(x,y,z)

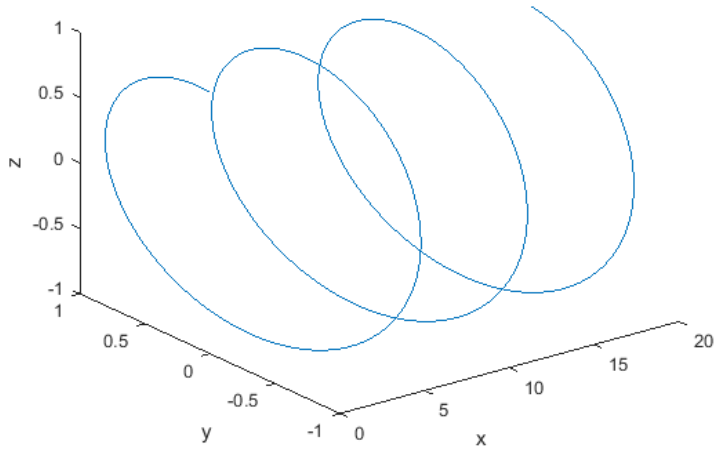
This command plots x, y and z in a 3D environment. Please note that x, y and z should be vectors with same lengths.

Example:

```
x=0:0.01:6*pi;

y=sin(x);
```

```
z=cos(x);
plot3(x,y,z)
xlabel('x')
ylabel('y')
zlabel('z')
```



D.2 Mesh(x,y,z)

This command plots one point for each of the x(i) and y(j) point with the z axis value equal to z(i,j).

Example:

Please open the example.m file (it is an m-file) in the m-file editor of MATLAB.