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 “\texttt{and(\&), or()}, \texttt{xor}, \texttt{not, ==, >, <, >=, <=}” operators.

Let’s see how they work:

\[
\begin{align*}
1 \text{ and } 1 &= 1 \\
1 \text{ or } 1 &= 1 \\
1 \text{ xor } 1 &= 0 \\
\text{not } 1 &= 0 \\
1 \text{ and } 0 &= 0 \\
1 \text{ or } 0 &= 1 \\
1 \text{ xor } 0 &= 1 \\
\text{not } 0 &= 1 \\
0 \text{ and } 0 &= 0 \\
0 \text{ or } 0 &= 0 \\
0 \text{ xor } 0 &= 1 \\
3 > 7 &= 0 \\
3 \geq 3 &= 1 \\
3 > 3 &= 1
\end{align*}
\]

Please note that MATLAB translates any number except zero as “True”.

Example:

\[-5 \mid 0 = 1\]
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
```

```


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:
\[
a=0;\\
\text{for } i=1:5\\
\quad a=a+i\\
\text{end}
\]

B.2.1. “while”

```matlab
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**

```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:

\[
\text{subs}(z,\{x,y\},\{1\ 2\})
\]

It is equivalent to: \( z = x + y^2 = 1 + 2^2 = 5 \)

Also, to integrate and differentiate symbolic statements we can use \text{int} and \text{diff} commands respectively.

Example 1:

\[
\text{Int}(z,y)
\]

Try it yourself!

Example 2:

\[
\text{diff}(z,y)
\]

Try it yourself!

**D. 3D Plotting**

In this part we will discuss two different functions for plotting data in a three dimensional 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:

\[
\begin{align*}
x &= 0:0.01:6*\pi; \\
y &= \sin(x);
\end{align*}
\]
\[ z = \cos(x) \];
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.