CE-8 Lab 2: Basic MATLAB Use - Part 2

Lab Objectives

(PLEASE BRING YOUR ROBOT AUTOMATION BOOK TO LABS.)

By the end of this lab you should be able to:

1. **Identify** what a variable is and how one is used in a program.
2. **Create** a program that properly uses IF, ELSE commands.
3. **Use** IF ELSE and FOR to give any condition and repetition to calculate multiple problems all at the same time.

Variables

You can use variables in expressions to set their values. It’s important to remember when working with expressions that the right hand side of the expression is evaluated first. For example, if want our variable ‘xyz’ to be equal to 5 plus 3 we would simply write:

```
xyz = 5+3
```

This statement first computes 5 plus 3 and then sets the variable 'xyz' to that value. We can also use variables in the right hand side equation, even if it’s the same variable as the one on the left hand side. For example:

```
xyz = 5+3
xyz = xyz*2
```

What do you suppose the value of 'xyz' is? Let's look at these two commands in the way our robot will look at them. The first thing it does will add 5 and 3, it will then set 'xyz' to be equal to this value which is 8. It will then take the value of 'xyz', which is 8, and multiply it by 2, which is 16. It will then set 'xyz' to be this value, so we've effectively doubled the value of 'xyz' with this command.

‘if…..elseif…..else…..’

One of the main tools used by programmers is the IF...THEN statement. The IF...THEN statement is a simple way to direct the behavior of our robot based on the truth of some statement. The basic syntax of the IF...THEN statement is as follows:

```
if condition
some action
```
We can read the syntax of the if….else statement as the same way we tell someone of some action we might perform. For example, 'If it's sunny outside then I will go for a walk'. Notice the similarities in this sentence and that of our if….else…. statement. What is the condition that I will go for a walk in this sentence? The condition could be anything we want it to be, in our robot we usually will use a condition based on one of our sensors or perhaps what the robot is currently doing or even the value of some variable. The ways in which we test a condition is by using comparison operators, the main operators that we use are.

<table>
<thead>
<tr>
<th>Comparison Operator Symbol</th>
<th>Definition</th>
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<tbody>
<tr>
<td>=</td>
<td>Equal</td>
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<tr>
<td>&lt;&gt;</td>
<td>Not Equal</td>
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<tr>
<td>&gt;</td>
<td>Greater Than</td>
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<td>Less Than</td>
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<td>&gt;=</td>
<td>Greater Than or Equal To</td>
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<tr>
<td>&lt;=</td>
<td>Less Than or Equal To</td>
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You might recognize some of these operators from your algebra class. Here is an example of a working if…else… statement. The variable 'xyz' will be the value you assign, and your output can be whatever you want them to be. Here is an example.

```plaintext
xyz=1
if xyz ==1
    x=1
else
    y=2
end
```

What do you think your output on the screen?
Exercises

1. Using a ‘if…else…’ like above, print a message that if your ‘xyz’ is bigger than or equal to 0.9, then print ‘You ACE the course!!’. If your xyz is in between 0.8 and 0.9, then print, ‘You Almost aced the course’; otherwise, print ‘You ACE the course..NOT’
2. Using a ‘if…else’ or ‘while’, divide 1000 by 2 until your result becomes less than 1 and count the number of repetition.
3. Make a very simple program that does the following..

You enter any number between -1 and 1, and your program calculates arc cosine and arc sine in both degree and radian. (Example: put 0, arc cosine is either 90 degree or pi/2, and 270 degree or 3pi/2.) For your convenience, your answer can be between 0 and 180 degree (pi).