

LAB 3

CS1109

2nd July, 2013

1. Complete the following -

a. `isnumeric(30)` % _____

b. `isnumeric(a)` % _____

c. `isnumeric(pi)` % _____

d. `isnumeric('a')` % _____

e. What is the difference between 3 and 5?

% _____

f. `fprintf('Today is %d/%d/%d', 7, 2, 2013);` % _____

g. Download the zip folder lab3.zip from the location - www.cs1109.info/labs/lab3/lab3.zip. Unzip the files to Desktop. Open the file `test_while.m`. There is a bug in the program. Fix it and then run the script from the command prompt as `- test_while`. Check the output. What was the issue? _____

Now, change the `fprintf` statement to `fprintf('\ni = %d j = %d', i, j);`

What did '\n' do to the output? _____

h. Try the following rounding functions --

floor	ceil	fix	round
<code>floor(4.55)</code> % _____	<code>ceil(4.55)</code> % _____	<code>fix(4.55)</code> % _____	<code>round(4.55)</code> % _____
<code>floor(4.33)</code> % _____	<code>ceil(4.33)</code> % _____	<code>fix(4.33)</code> % _____	<code>round(4.33)</code> % _____
<code>floor(-4.33)</code> % _____	<code>ceil(-4.33)</code> % _____	<code>fix(-4.33)</code> % _____	<code>round(-4.33)</code> % _____
<code>floor(-4.55)</code> % _____	<code>ceil(-4.55)</code> % _____	<code>fix(-4.55)</code> % _____	<code>round(-4.55)</code> % _____

i. `rand(2,3)` %How many rows= ___ columns= ___ does it show?

j. `rand(4)` %How many rows= ___ columns= ___?

k. `x = 100;`

`if 0 < x < 90`

`disp(x);`

`end`

%What is the output? _____

```

1. x = 100;
   if x > 0 && x < 90
       disp(x);
   end
                                     %What is the output? _____

```

m. Why did **1** show wrong output and **m** the correct output?

n. Encircle the valid variable names – Check as **x = 5** etc. on the command window

X	x	abc	pi	abc's	ab*c	ab_c	AbC
2a	a2	_a	a_	a/bc	n!	end	input

- Avoid creating variable names with the same name as a function, e.g. square, disp etc.
- Avoid using keywords as variable names, e.g. end, for, while etc.
- Avoid using mathematical constants already defined in MATLAB, e.g. pi, TRUE, FLASE etc.
- MATLAB is case sensitive X and x are different variables
- namelengthmax % _____

- Open the file *testElseif.m*. Study how the conditions are implemented and how the **if-elseif-end** is used. Once you understand how the code works especially the third **elseif** which contains another **if**, open the file *findGreatest.m*. We have provided the code for you using the **if-else-end**. Modify the program to use **if-elseif-end**
- Open the file *hm.m*. Complete the 'while' loop such that it calculates the harmonic mean of first N natural numbers. Follow the instructions in the comments.

Harmonic mean is given by the formula –

$$H = \left(\frac{1}{n} \cdot \sum_{i=1}^n x_i^{-1} \right)^{-1} = \frac{1}{\frac{1}{n} \cdot \left(\frac{1}{x_1} + \frac{1}{x_2} + \dots + \frac{1}{x_n} \right)} = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \dots + \frac{1}{x_n}}$$

- Add code to *hm* function to display a message if N is a negative number or 0, for example as *hm(-3)* or *hm(0)*.
- Add code to *hm* function to display a message if a character is entered, for example as *hm('a')*. To test if a character typed in is a number or not, use the function `isnumeric(x)` and find the harmonic mean only if a valid number is entered. Use **help** to get more information. **Note:** A value returned from a function can be set to a variable, for e.g. `t = cos(pi)`; sets the value of **t** as -1.
- Use **floor** function if N is a decimal number e.g. *hm(5.66)*.

4. Challenge

Open the file *w_hm.m*. Write code to find the weighted harmonic mean of N natural numbers. For weight of each number generate a random value (weight) within the range [1, N].

Weighted Harmonic Mean is given by the formula –

$$\frac{\sum_{i=1}^n w_i}{\sum_{i=1}^n \frac{w_i}{x_i}}$$