BRAC UNIVERSITY

Inspiring Excellence

Department of Computer Science and Engineering

CSE330: Numerical Methods (Lab)

Assignment 1, Summer 2019

Total Marks: 20

- Use Matlab to solve the following problems
- Follow the the instructions given in the "*instructions.txt*" file for submission
- There will be penalty for copying the assignment

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* For the following questions assume your **8 digit Student ID number** as the values of A,B,C,D,E,F,G,H respectively. For example: If your student ID is 19201023 then $A = 1,\ B = 9,\ C = 2,\ D = 0,\ E = 1,\ F = 0,\ G = 2,\ H = 3$.

* In addition to that, M = **your theory section number**

Marks

1. Now use these values to solve the following equations using Matlab: 5x1 =5

   a) $AB + \sqrt{B^3 - A^C} - 4(G+H)$

   b) $3AC^2 - \left\lceil \frac{B}{\pi} \right\rceil + \lfloor \sqrt{16B - DH} \rfloor$

   c) $\frac{M}{C} + 2\pi \left\lfloor \frac{M^2 C}{B} \right\rfloor - |GH - BM|$

   d) $\frac{\log(2.44) * \log(2M)}{e^{E-2FD}} + |2EF - M^3|$

   e) $e^{\lceil \log(2\pi A) \rceil} + DG$

2. Generate the following patterns: (Your code must work for any given number of rows) 2x2 = 4

a)

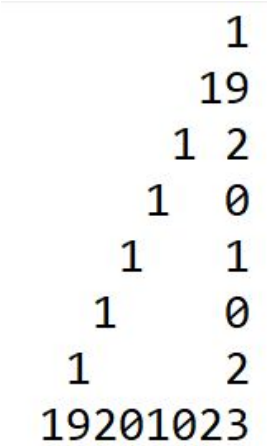
b)

2x2 = 4

3.

a) What's the difference between **disp()** and **fprintf()** function. Give examples of use cases for each function.
b) Assume that two arrays/matrix are denoted as X, Y. Now write down the equations that will perform: multiplication, element-wise multiplication, transpose of X, element-wise power raise of X to the power 5.

4. Generate the following pattern with your student id. Ex: if student id is 19201023 then your pattern should look like this: 3



5. In this problem, you are asked to plot projectile trajectories using equations for ideal projectile motion. Here, **y(t)** is the vertical distance and **x(t)** is the horizontal distance travelled by the projectile in meters, **g** is the acceleration due to Earth's gravity = 9.8 m/s^2 and **t** is time in seconds. Assume that the initial velocity of the projectile $v_0 = 10 \times (\mathrm{B} + \frac{G}{10})$ m/s and the projectile's launching angle, $\theta_0 = \frac{5B+H}{10}$ radians. The initial vertical and horizontal positions of the projectile are given by y_0 = 0 m and x_0 = 0 m.

Now plot ***y vs. t*** and ***x vs. t*** in two separate graphs with the vector: ***t*=0: 0.1: 10** representing time in seconds. Give appropriate titles to the graphs and label the axes. Make sure the grid lines are visible. [Note: use the B, G, H 's value from your student id, as explained before]

$$y(t) = y_0 - \frac{1}{2}gt^2 + (v_0 \sin(\theta_0))\, t$$
$$x(t) = x_0 + (v_0 \cos(\theta_0))\, t$$

- The End -