

Homework 1: Getting Started

(Version 1.0)

Release Date: 17.10.2016**Due On:** 31.10.2016 @ 23:55**(LATE Submissions for ANY reasons will NOT be accepted)****Version history:**

v1.0: Homework 1.0 is released.

Submission Rules:

Each student must submit individual solutions for these homework problems. You may use any source at your disposal—paper, electronic, or human—but you must cite every source that you use. Submit your solutions through **ODTUCLASS**. *While submitting, you should include the ".m" (for MATLAB) files with your printed results (i.e., screen shots) in a compressed file (*.zip, *.rar, etc.).*

WRITE COMMENTS IN YOUR CODES, USE VARIABLE NAMES AS DESCRIBED IN THE CLASS!

CAUTION: For this homework **DO NOT** use control statements (e.g. if, while, for) while solving the problems. Submit your solutions in script format.

1. **(15 pts)** Create a matrix of size 5*5 ('magic' function) and compute the number of odd numbers in this array.
(Hint: mod function)
2. **(15 pts)** Find the five roots of equation $0.5x^6 + 3.15x^5 - 7.2x^3 + 1.32x = 0$.
(Hint: 'roots' function)
3. **(20 pts)** Solve the system of linear equations by using:
 - a) Matrix Inversion Method ($AX = B \rightarrow X = A^{-1}B$).
 - b) Built in function called 'solve'.
 - $12a + 3b + 5c = 10$
 - $5a - 6b + 13d = 5$
 - $8a + 4b + 3c + 2d = 0$
 - $-a + 20b + 3c - 3d = 1$
4. **(15 pts)** Given an array $X = [1, 15, 89, 3, 529, 511, 2, 98, 52, 1, 0, 789, 51, 6]$:
 - a) Create three arrays. First array should contain elements which have value between 101-1000, second array should contain elements between 11 – 100 and the third one, 0 – 10. i.e.
 - $X1 = [529, 511, 789]$
 - $X2 = [15, 89, 98, 52, 51]$
 - $X3 = [1, 3, 2, 1, 0, 6]$
 - b) Sort the elements of X1, X2 and X3 arrays in increasing order and save them in new arrays called sortedX1, sortedX2 and sortedX3.

5. (15 pts) You are given two arrays named 'a' and 'b'.

- a = [1, 2, -3, 4, 5, -6]
- b = [1, -1.5, 0, 2.5, 5, -6]

Find the different elements of arrays 'a' and 'b' (only compare respective elements) and store these elements in a matrix called 'diffMat'. The resulting matrix you obtain should be similar to the one given below:

```
diffMat =
    2.0000    -3.0000     4.0000
   -1.5000     0.0000     2.5000
```

6. (20 pts) A square footing having 6 m width (B) is going to be built on a clayey soil profile and you need to estimate consolidation settlement. Therefore, stress changes beneath the foundation are going to be calculated. By using the 30° method and assuming that the net foundation pressure is 80 kPa, plot Stress Change vs. Depth graph on MATLAB. (Take $D_f = 0$ and plot your graph up to Depth = 2*B)

$$\Delta q = \frac{q \cdot B \cdot L}{(B + 2z \cdot \tan 30^\circ)(L + 2z \cdot \tan 30^\circ)}$$

The final form of the plot should look like the one shown below. Arrange the axes positions and labels accordingly.

