EE393 HW - 09.11.2020
Due: 17.11.2020, 23:59

In this homework, you will develop a python program which reads coefficients and right hand side vector of a linear equation system and then solves it using numpy linear equation solver. Instructions are given below:

Download **nov09.txt** which contains a 4x4 matrix and a 4x1 vector to form a 4x4 linear equations system. Develop a Python program which performs the followings:

- Solve the equation using numpy library. You will read the coefficients from the file and construct numpy arrays properly.
- Print the solution on the console as well as write to a file **"output.txt"** which contains the equations in a fancy format and gives the solution.
- Verify that solution is correct. Develop a **solutionTest** function which returns **true** if the solution satisfies the equation system and false if not.

Sample input file (nov09.txt) is seen below. The output which is written to the screen as well as to the "output.txt" is seen below.

```
COEFFICIENTS
SIZE: 4
3.50 2.77 -0.76 1.80
-1.80 2.68 3.44 -0.09
0.27 5.07 6.90 1.61
1.71 5.45 2.68 1.71

7.31 4.23 13.85 11.55
```

```
Number of Equations : 4
EQUATIONS
----------
+3.5x1+2.77x2-0.76x3+1.8x4=7.31
-1.8x1+2.68x2+3.44x3-0.09x4=4.23
+0.27x1+5.07x2+6.9x3+1.61x4=13.85
+1.71x1+5.45x2+2.68x3+1.71x4=11.55
SOLUTION:
----------
x1=1.000000000000083
x2=1.0000000000000173
x3=1.000000000000025
x4=0.9999999999998221

Check if the solution satisfies the equations:
Equation   1  : Error is  0.0
Equation   2  : Error is  -8.881784197001252e-16
Equation   3  : Error is  -1.7763568394002505e-15
Equation   4  : Error is  -1.7763568394002505e-15
SOLUTION IS CORRECT WITH A TOTAL ERROR OF  -4.440892098500626e-15
```

What to submit:

1) ipynb file which contains **your code** . Note that you are encouraged to develop your program using a modular approach. As a minimum, your program should contain "solutionTest" function.
2) We will test your code using a similar (but different) input file. Your program MUST work for arbitrary number of equations.
3) Assume that input file is given properly (i.e. exactly as in the sample input file). You don't need to check for exceptions.

Penalties :

- late submission, cheating and non-working code: up to -100pts
- improper commenting : up to -20pts
- not using solutionTest : up to -50pts
- no driver program : up to -50pts
- improper coding style: up to -10pts (like, variable names and indents)
- improper input/output file names : up to -100pts
- program does not work for our test input : up to -100pts
- program does not print output to screen : up to -40pts
- Output is not fancy looking : up to -30pts