

# **Python Classes – Exercises Set 8**

Vetrivel V

- ❑ Write the following using Python Classes
  - Create a child class from the previous matrix and name it as Square matrix
    - Finding trace
    - Finding determinant (only for 3x3)
      - Use recursion to compute for higher dimensions
    - Find the inverse of A

- ❑ Write the following using Python Classes
  - Create a vector class
    - Do all possible vector operations
    - Use Matrix class and vector class to define matrix vector product

- Write the following using Python Classes
- Consider the interval  $[-\pi, \pi]$ . Get an integer input  $N$  from user. Using Python program compute and output  $N$  points with equal distance between adjacent points. Store the output in an array. That is,  $x_0, x_1, x_2, \dots, x_{N-1}$  such that
$$x_{i+1} - x_i = x_1 - x_0 = dx, \forall i.$$

- ❑ Consider the following two function  $f$  and  $g$ 
  - ❑  $f(x, n) = x^2 \cos nx$
  - ❑  $g(x, n) = x^2 \sin nx$
- ❑ Use the matrix class created in Exercise 19. Compute the values of  $f(x_i, n)$  and  $g(x_i, n)$ , where  $n$  can be any integer between 0 and 20,  $x_i$ 's are from Exercise 22. Store the values of  $f(x_i, n)$  in a matrix  $F_{N \times 21}$
- ❑ Store the values of  $g(x_i, n)$  in a matrix  $G_{N \times 21}$

□ Compute the following expression

$$a_0 = \frac{dx}{2\pi} \sum_{i=0}^{N-1} F_{i0}$$

$$a_n = \frac{dx}{\pi} \sum_{i=0}^{N-1} F_{in}, n = 1, 2, \dots, 20$$

$$b_n = \frac{dx}{\pi} \sum_{i=0}^{N-1} G_{in}, n = 0, 1, 2, \dots, 20$$

Save  $a = (a_0, a_1, \dots, a_{20})$  and  $b = (b_0, b_1, \dots, b_{20})$  in files Avec.dat and bvec.dat

□ Compute approximated Fourier Series,

$$h(x) = \sum_{n=0}^{20} a_n \cos nx + b_n \sin nx$$

Where  $a'_n$ s and  $b'_n$ s are from Exercise 24

□ Verify that when  $h(x) = x^2$

$$\pi^2 = h(\pi) \approx \frac{\pi^2}{3} + 4 \sum_{n=1}^{20} \frac{1}{n^2}$$

□ Plot the graph  $h(x) = x^2$  in the interval  $[-\pi, \pi]$

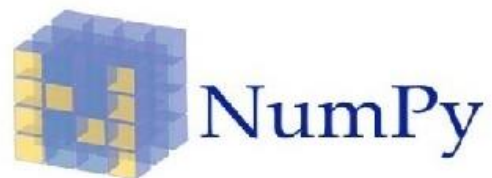
□ Plot the graph  $s(x)$  against  $x$

$$s(x) = \sum_{n=0}^k a_n \cos nx + b_n \sin nx$$

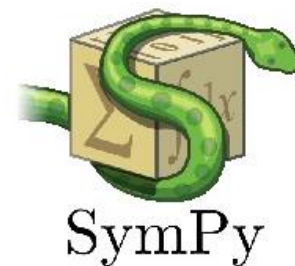




# End of Python Classes



IP[y]:  
IPython



pandas  
 $y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$

