Odd Semester Examination, 2021

Sem-3 PHSA Paper : CC-5-P

Full Marks : 30 Time : 2 hours

Answer all questions.

1. (a) What is the function of data type object in a numpy array ? 2

   (b) Explain the results of execution of the following utilities 2

   np.arange(10,5,-1.5), np.linspace(10,5,2.5).

   (c) What are the possible utilities to create a sixth oder identity matrix using numpy ? 2

2. (a) Write down the algorithm of reading a two dimensional array. 3

   (b) Write down the result of execution of *b=np.logspace(1,2,10)* and draw the graph of *b*. 2+1

3. Explain how is it possible to convert the equation

$$\begin{pmatrix} a_{11} & a_{12} & a_{12} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix}$$

   to an equation in which the coefficient matrix is an upper triangular matrix. Write a python function to numerically evaluate the elements of the upper triangular matrix, using the *for* loop. 3 + 3

4. What is single variable interpolation of a function $f(x)$?
   Given
   $x = [0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0]$
   $f = [-1.26, -1.10, -0.91, -0.67, -0.54, -0.32, -0.10, 0.08, 0.33, 0.51]$
   Write a python function that evaluates, by exlicit loop comprehention, the value of $f(x)$ at $x = 0.58$. 2 + 4

5. What is the Riemann definition of integral of a function $f(x)$? How does Simpson's rule approximates the function $f(x)$? Write a python fuction to numerically implement the Simpson's rule, using loop comprehention. 2 + 1 + 3