

1. Read a CSV file with 10 numbers in each row (5 rows), and store them in numpy array, print the values and maximum and minimum value of the array. Also save the same array in another file in TSV format
2. Create a small dataset of floating point numbers with 10 rows and 5 columns in ARFF format with proper header values. Read the files and store the numbers in numpy array. Reshape the array to 5 rows and 10 columns using numpy. Print the following properties of the array for both before and after reshaping. Print number of dimensions, shape of the array, size of the array, data type of the array and item size of the array.
3. Create a 3\*3 matrix A [1 1 1, 2 2 2, 3 3 3] and B [4 4 4, 5 5 5, 6 6 6]. Print the following values. 1. Add A and B, 2. Subtract A from B, 3. Elementwise multiplication A and B, 4. Divide B by A. 5. Square root of B, 6. Square of A.
4. Create a 4\*4 matrix A [1 1 1 1, 2 2 2 2, 3 3 3 3, 4 4 4 4] in numpy. Print the following matrix operations using built-in numpy functions. 1. Determinant of the matrix, 2. Inverse of a matrix, 3. Transpose of the matrix A, 4. Scalar multiplication with number, 5. Matrix multiplication with matrix B [2 2 2 2], 6. Dot product between rows of A and matrix B [2 2 2 2]. 7. Determinant of the matrix A.
5. Create a 3\*3 matrix A [ 4 5 6, 1 2 3, 7 8 9]. Flat the matrix into an array and print the sorted array in ascending and descending order using numpy functions. Print the mean, standard deviation and variance of the sorted array.
6. Create a 3\*3 matrix A [1 5 2, 2 4 1, 3 6 2]. Perform the following linear algebra operations using scipy. 1. Perform SVD and print the U and V, 2. Perform Eigen decomposition and print the eigen values and eigen vectors, 3. Perform QR decomposition and print the Q and R.
7. Read a JPG image using scipy and resize it into square image of dimensions 300\*300 and store it as PNG image. Display both original and resized images.
8. Read the image <https://upload.wikimedia.org/wikipedia/en/2/24/Lenna.png>. Convert the image data to gray scale 2D array. Convolve the array with matrix [0 1 0, 0 1 0, 0 1 0] and display the gray scale image and convolved image.
9. Read the image <https://upload.wikimedia.org/wikipedia/en/2/24/Lenna.png>. Rotate the image to 45 degrees right and display along with original image using scipy.
10. Read the image [https://www.math.u-bordeaux.fr/~cdeledal/img/ppb\\_r2/lena\\_L3.png](https://www.math.u-bordeaux.fr/~cdeledal/img/ppb_r2/lena_L3.png) and apply Gaussian smoothing with sigma 1 and 2 and display the smoothed images along with original.

## **Guidelines**

- File name of each program should be with name and registration number. Ex. Pgm1\_Sridhar\_phd101.py, Pgm2\_Sridhar\_phd101.py
- Program file types should be .py
- Programs should be compatible to Python 3
- Zip the programs in single file with name and registration number. Ex. Assingment2\_Sridhar\_phd101.zip
- All programs should be documented properly
- All assignments will be subjected to plagiarism checking