a. Write a Python program to do the following operations: Library: NumPy

1. Create a one-dimensional array and perform all operations on it.
2. Create multi-dimensional arrays and find its shape and dimension
3. Create a matrix full of zeros and ones
4. Reshape and flatten data in the array
5. Perform arithmetic operations on multi-dimensional arrays
6. Append data vertically and horizontally
7. Apply indexing and slicing on array
8. Use statistical functions on array - Min, Max, Mean, Median and Standard Deviation
9. Dot matrix product of two arrays
10. Compute the Eigen values of a matrix
11. Solve a linear matrix equation such as 3 \* x0 + x1 = 9, x0 + 2 \* x1 = 8
12. Compute the multiplicative inverse of a matrix
13. Compute the rank of a matrix
14. Compute the determinant of an array
15. Perform transpose and change of axes operations on arrays.
16. Perform splitting operations on arrays.

1.How to convert an array of strings to an array of floats in numpy?

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| import numpy as np    string\_arr = np.array(['1.1', '2.2', '3.3'])  float\_arr = string\_arr.astype(np.float64)  print(float\_arr) |

# 2. Extracting first n columns of a Numpy matrix

# Range of Columns

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| import numpy as np    the\_arr = np.array([[0, 1, 2, 3, 5, 6, 7, 8],                      [4, 5, 6, 7, 5, 3, 2, 5],                      [8, 9, 10, 11, 4, 5, 3, 5]])      print(the\_arr[:, 1:5])  3.How to calculate the sum of every row in a NumPy array in Python?  import numpy as np    arr = np.array([1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12])    newarr = arr.reshape(4, 3)  print(newarr)    column\_sums = newarr.sum(axis=1)  print(column\_sums) 4. How to check all elements are NaN in a NumPy Array in Python? import numpy as np      the\_array = np.array([np.nan, 2, 3, 4])  array\_has\_nan = np.isnan(the\_array).all()  print(array\_has\_nan)      the\_array = np.array([np.nan, np.nan, np.nan, np.nan])  array\_has\_nan = np.isnan(the\_array).all()  print(array\_has\_nan) 5. How to multiply each element of Numpy array in Python? import numpy as np    the\_array = np.array([[1, 2, 3], [1, 2, 3]])    prod = np.prod(the\_array)  print(prod) 6. Scalar Arithmetic Operations on NumPy Array **import** numpy **as** np    array1 = np.array([[10, 20, 30], [40, 50, 60]])    **print**(array1 + 2)  **print**("-" \* 20)    **print**(array1 - 5)  **print**("-" \* 20)    **print**(array1 \* 2)  **print**("-" \* 20)    **print**(array1 / 5)  **print**("-" \* 20)    **print**(array1 \*\* 2)  **print**("-" \* 20) 7. How to check for NaN elements in a NumPy Array in Python? import numpy as np    the\_array = np.array([np.nan, 2, 3, 4])  array\_has\_nan = np.isnan(the\_array).any()  print(array\_has\_nan)    the\_array = np.array([1, 2, 3, 4])  array\_has\_nan = np.isnan(the\_array).any()  print(array\_has\_nan) 8. NumPy Element Wise Mathematical Operations **import** numpy **as** np    array1 = np.array([[10, 20, 30], [40, 50, 60]])  array2 = np.array([[2, 3, 4], [4, 6, 8]])  array3 = np.array([[-2, 3.5, -4], [4.05, -6, 8]])    **print**(np.add(array1, array2))  **print**("-" \* 40)    **print**(np.power(array1, array2))  **print**("-" \* 40)    **print**(np.remainder((array2), 5))  **print**("-" \* 40)    **print**(np.reciprocal(array3))  **print**("-" \* 40)    **print**(np.sign(array3))  **print**("-" \* 40)    **print**(np.ceil(array3))  **print**("-" \* 40)    **print**(np.round(array3))  **print**("-" \* 40) 9. How to count frequency of unique values in a NumPy array in Python? import numpy as np    the\_array = np.array([9, 7, 4, 7, 3, 5, 9])    frequencies = np.asarray((np.unique(the\_array, return\_counts=True))).T  print(frequencies)  10. Write a NumPy program to get the indices of the sorted elements of a given array.  **Sample Solution**:  **Python Code:**  import numpy as np  student\_id = np.array([1023, 5202, 6230, 1671, 1682, 5241, 4532])  print("Original array:")  print(student\_id)  i = np.argsort(student\_id)  print("Indices of the sorted elements of a given array:")  print(i) 11. How to print a full NumPy array without truncation in Python? import numpy as np      np.set\_printoptions(threshold=np.inf)    the\_array = np.arange(100)  print(the\_array 12. How to get the transpose of a NumPy array in Python? import numpy as np    the\_array = np.array([[1, 2], [3, 4]])  print(the\_array)    print(the\_array.T) 13. How do you replace items that satisfy a condition with another value in Numpyarray? import numpy as np    the\_array = np.array([49, 7, 44, 27, 13, 35, 71])    an\_array = np.where(the\_array > 30, 0, the\_array)  print(an\_array) |
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