**Advanced Programming in Python**

**Assignment no. 5**

**math library function:** math module is a built-in function used for mathematical tasks such as finding the sin, cos, tan values of a number and many more such values. Detail of some of these functions is as follows:

* math.sqrt() ----------------> returns the square root of a number
* math. degrees() -------------> converts angle from radians to degrees
* math.radians() -------------> converts angle from degrees to radians
* math.pow(x, y) -------------> returns value of x to power of y
* math.log() -------------> returns natural log of a number
* math.fsum() -------------> Returns the sum of all items in any iterable (tuples, arrays, lists, etc.)
* math.ceil() -------------> Rounds a number up to the nearest integer
* math.comb() -------------> Returns the number of ways to choose k items from n items without repetition and order
* math.perm() -------------> Returns the number of ways to choose k items from n items with order and without repetition

**numpy:** numpy is a python library used for fast numerical computations, high level mathematical functions and working with arrays, matrices.

Structured lists of numbers:

• Vectors

• Matrices

• Images

• Tensors

• ConvNets

Numpy can be used in program by importing numpy library into the program by using the import function.

Some **numpy** functions:

* np.array(x) -------------> To make an array of numbers. (Where x is a list of numbers, lists etc.). all elements of an array should have same data type.
* np.ones(n) -------------> create an array of ones of order n
* np.zeros(n) -------------> create an array of zeros of order n
* np.reshape(n,m) -------------> reshape an array in n\*m order
* np.arange(n) -------------> create an array of numbers from 0 to n-1
* np.T(n) or np.transpose(n) -------------> create a transpose matrix of n
* np.empty(n,m) -------------> create an empty array of order n\*m
* np.sort() -------------> Sort an array
* np.concatenate() -------------> combine two arrays

Some rules for using numpy:

* You can make multidimensional arrays by giving more than one array as argument when using np.array()
* Mathematical functions such as sqrt(), exp() can be used for element wise operation in array
* Multiplying two arrays gives element wise multiplication and using np.dot() function returns matrix multiplication
* While using np.reshape() function, total number of elements should remain same.
* An array of random numbers can be produced by using np.random() function and entering order of array as argument
* Mean of numbers in a array can be obtained by using np.mean() function and giving array as an argument. Same can be done for sum by using np.sum()
* You can iterate through array using for loop
* Members of array can be accessed using index number starting from 0