Exercise 1: Working with Numpy arrays

1) Write a NumPy program to create an array of 10 zeros, 10 ones, and 10 fives.
2) Write a NumPy program to create a 3x3 identity matrix and stack it vertically and horizontally.
3) Write a NumPy program to test element-wise for complex numbers, real numbers in a given array. Also test if a given number is of a scalar type or not.
4) Write a NumPy program to compute the inner product of two given vectors.
5) Write a NumPy program to compute the multiplication of two given matrixes.
6) Write a NumPy program to compute the eigenvalues and right eigenvectors of a given square array.
7) Write a NumPy program to compute the determinant of an array.
8) Write a NumPy program to create an 8x8 matrix and fill it with a checkerboard pattern.
9) Write a NumPy program to convert Centigrade degrees into Fahrenheit degrees. Centigrade values are stored in a NumPy array.
10) Write a NumPy program to find the union of two arrays. Union will return a unique, sorted array of values in each of the two input arrays.
11) Write a NumPy program to convert cartesian coordinates to polar coordinates of a random 10x2 matrix representing cartesian coordinates.
12) Write a NumPy program to sort the student id with increasing height of the students from given students id and height. Print the integer indices that describes the sort order by multiple columns and the sorted data.
13) Write a NumPy program to partition a given array in a specified position and move all the smaller elements values to the left of the partition, and the remaining values to the right, in arbitrary order (based on random choice).
14) Write a NumPy program to extract all the rows to compute the student weight from a given array (student information) where a specific column starts with a given character.
15) Write a NumPy program to compute the histogram of numbers against the bins.
16) Write a NumPy program to compute the mean, standard deviation, and variance of a given array along the second axis.
17) Write a NumPy program to multiply a matrix by another matrix of complex numbers and create a new matrix of complex numbers.

18) Write a NumPy program to find the roots of the following polynomials.
    a) x2 - 4x + 7.
    b) x4 - 11x3 + 9x2 + 11x =10
19) Write a NumPy program to compute the trigonometric sine, cosine and tangent array of angles given in degrees.
20) Write a NumPy program to compute natural, base 10, and base 2 logarithms for all elements in a given array.
21) Write a NumPy program to multiply a matrix by another matrix of complex numbers and create a new matrix of complex numbers.
22) Write a NumPy program to find the first Monday in August 2023.
23) Write a NumPy program to get the dates of yesterday, today and tomorrow.
24) Write a NumPy program to remove the leading and trailing whitespaces of all the elements of a given array.
25) Write a NumPy program to split a given text into lines and split the single line into array values.
26) Write a Numpy program to test whether a numpy array is faster than a Python list or not.
27) Write a NumPy program to create a 11x3 array filled with student information (id, class and name) and shuffle the rows of the array starting from 3rd to 9th.
28) Write a NumPy program to subtract the mean of each row from a given matrix.
29) Write a NumPy program to compute the covariance matrix of two given arrays.
30) Write a NumPy program to create a 5x5 array with random values and find the second-largest value in each row.