Assignment-4

1. Write a python class to show how we can changes to the class variable in python. Also write a code to create an empty class.
2. Write a python class to convert Hexadecimal to Decimal using class creation.
   Example: Input Hexadecimal: C77, Output Decimal: 3191
3. Write a python class to check if a class is a subclass of another class or not.
4. Write a python class to access a member through super and parent class name.
5. Write a Python class named Rectangle constructed by a length and width and a method which will compute the area of a rectangle.
6. Write a Python class to reverse a string word by word.
   Example: Input string: hello, Output string: olleh
7. Write a Python class to find the three elements that sum to zero from a set of n real numbers.
   Example: Input array : [-25, -10, -7, -3, 2, 4, 8, 10]
   Output : [[-10, 2, 8], [-7, -3, 10]]
8. Write a Python class to find a pair of elements (indices of the two numbers) from a given array whose sum equals a specific target number.
   Example: Input: Numbers: [10,20,10,40,50,60,70], target=50
   Output: 3, 4
9. Write a NumPy program to sort a given array of shape 2 along the first axis, last axis and on flattened array.
   Example: Expected Output:
   Original array:
   [[10 40]
   [30 20]]
   Sort the array along the first axis:
   [[10 20]
   [30 40]]
   Sort the array along the last axis:
   [[10 40]
   [20 30]]
   Sort the flattened array:
   [10 20 30 40]
10. Write a NumPy program to compute the trigonometric sine, cosine and tangent array of angles given in degrees. **Note:** Angles are 0, 30, 45, 60, 90.
    Example: Output:
    sine: array of angles given in degrees
    [0. 0.5 0.70710678 0.8660254 1.]
    cosine: array of angles given in degrees
    [1.00000000e+00 8.66025404e-01 7.07106781e-01 5.00000000e-01 6.12323400e-17]
    tangent: array of angles given in degrees
    [0.00000000e+00 5.77350269e-01 1.00000000e+00 1.73205081e+00 1.63312394e+16]
11. Write a NumPy program compute the sum of the diagonal element of a given array.
    Exanple: Original matrix: [[0 1 2]
    [3 4 5]]
    Diagonal sum: 4
12. Write a NumPy program to create a 2d array with 1 on the border and 0 inside.
    Example: Expected Output:
    Original array:
    [[1. 1. 1. 1. 1.]
    [1. 1. 1. 1. 1.]
    [1. 1. 1. 1. 1.]
    [1. 1. 1. 1. 1.]
    [1. 1. 1. 1. 1.]]

1 on the border and 0 inside in the array
[[1. 1. 1. 1. 1.]
[1. 0. 0. 0. 1.]
[1. 0. 0. 0. 1.]
[1. 0. 0. 0. 1.]
[1. 1. 1. 1. 1.]]

13. Write a NumPy program to find the number of elements of an array, length of one array element in bytes and total bytes consumed by the elements.
Example: Array = [1,2,3]
Size of the array: 3
Length of one array element in bytes: 8
Total bytes consumed by the elements of the array: 24

14. Write a NumPy program to create a record array from a (flat) list of arrays.
Example: Arrays: [1,2,3,4], ['Red', 'Green', 'White', 'Orange'], [12.20,15,20,40]
Expected Output:
(1, 'Red', 12.2)
(2, 'Green', 15.0)
(3, 'White', 20.0)
15. Write a NumPy program to take values from a source array and put them at specified indices of another array.
Example: Input: [10. 10. 20. 30. 30.]
Output: Put 0 and 40 in first and fifth position of the above array
Array x after put two values: [0. 10. 20. 30. 40.]
16. Write a Pandas program to add, subtract, multiple and divide two Pandas Series.
Example: Input Series: [2, 4, 6, 8, 10], [1, 3, 5, 7, 9]
Output: add: 3, 7, 11, 15, 19 subtract: 1,1,1,1,1
multiply: 2, 12, 30, 56, 90 divide: 2.000000, 1.333333, 1.200000, 1.142857, 1.111111
17. Write a Python program to convert a NumPy array to a Pandas series.
Example: Sample Series:
NumPy array:
[10 20 30 40 50]
Converted Pandas series:
0 10
1 20
2 30
3 40
4 50
dtype: int64
18. Write a Pandas program to get the powers of an array values element-wise.
Note: First array elements raised to powers from second array
Sample data: {'X':[78,85,96,80,86], 'Y':[84,94,89,83,86],'Z':[86,97,96,72,83]}
Expected Output:
X Y Z
0 78 84 86
1 85 94 97
2 96 89 96
3 80 83 72
4 86 86 83

19. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.
Sample DataFrame:
exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'],
'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],
'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],
'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']}
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

Output:

	attempts	name	qualify	score
a	1	Anastasia	yes	12.5
b	3	Dima	no	9.0
c	2	Katherine	yes	16.5
d	3	James	no	NaN
e	2	Emily	no	9.0
f	3	Michael	yes	20.0
g	1	Matthew	yes	14.5
h	1	Laura	no	NaN
i	2	Kevin	no	8.0
j	1	Jonas	yes	19.0

20. Write a Pandas program to get the first 3 rows of a given DataFrame.
Example: Input: Sample DataFrame from question 19.
Output: First three rows of the data frame:

	attempts	name	qualify	score
a	1	Anastasia	yes	12.5
b	3	Dima	no	9.0
c	2	Katherine	yes	16.5

21. Write a Pandas program to select the rows where the score is missing, i.e. is NaN.
Sample DataFrame_1:
exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'],
'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],
'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],
'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']}
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

Output: Rows where score is missing:

	attempts	name	qualify	score
d	3	James	no	NaN
h	1	Laura	no	NaN

22. Write a Pandas program to select the rows the score is between 15 and 20 (inclusive).
Example: Input: Sample DataFrame_1 from question 21.
Output: Rows where score between 15 and 20 (inclusive):

	attempts	name	qualify	score
c	2	Katherine	yes	16.5
f	3	Michael	yes	20.0
j	1	Jonas	yes	19.0

23. Write a Pandas program to select the rows where number of attempts in the examination is less than 2 and score greater than 15.

    Example: Example: Input: Sample DataFrame_1 from question 21.

    Rows where score between 15 and 20 (inclusive):

	attempts	name	qualify	score
c	2	Katherine	yes	16.5
j	1	Jonas	yes	19.0

24. Write python program to plot histogram, bar chart, line graph, scatter graph for some sample data.
25. Write a python program to handle exception error using try and except, else, finally, and raise with in a single program.

    Example: Program using function which returns a/b, like c = ((a+b) / (a-b)).