

Assignment-4

1. Write a python class to show how we can change 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 a super and parent class name.
5. Write a Python class named Rectangle, constructed by a length and width and a method that will compute the area of the 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 from a given array whose sum is zero.
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:
Original array:
[[10 40]
 [30 20]]
Expected Output:
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.
Example: Input Angles are 0, 30, 45, 60, 90.
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 elements of a given array.
Example: Original matrix: [[0 1 2]
 [3 4 5]]
Diagonal sum: 4
12. Write a NumPy program to create a 2d array with “1” and “0” only, where 1 is on the border and “0” is inside the 2d array.
Example:
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 is inside the 2d 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 a given array, length of one array element in bytes, and the total bytes consumed by the elements of the given array.

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, 15.0, 20.0, 40.0]]

Expected Output:

```
(1, 'Red', 12.2)
(2, 'Green', 15.0)
(3, 'White', 20.0)
(4, 'Orange', 40.0)
```

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.]

Note: Put 0 and 40 in the first and fifth position of the above array.

Output: [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]
```

Output: Converted Pandas series:

```
0 10
```

```
1 20
```

```
2 30
```

```
3 40
```

```
4 50
```

```
dtype: int64
```

18. 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 |

19. Write a Pandas program to get the first 3 rows of a given DataFrame.

Example: Input: Sample DataFrame from question 18.

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 |

20. Write a Pandas program to select the rows where the score is missing, i.e., 'score': 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 |

21. Write a Pandas program to select the rows where the score is between 15 and 20 (inclusive).

Example: Input: Sample DataFrame_1 from question 20.

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 |

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

Example: Input: Sample DataFrame_1 from question 20.

Output:

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

23. Write a python program to plot a histogram, bar chart, line graph, scatter graph for some sample data.

Note: You can select any sample data to plot these graphs.

24. Write a python program to handle exception error using try and except, else, finally, and raise within a single program.