

ML ASSIGNMENT -1

Question 1

The following is a list of 10 students ages:

ages = [19, 22, 19, 24, 20, 25, 26, 24, 25, 24]

- Sort the list and find the min and max age
- Add the min age and the max age again to the list
- Find the median age (one middle item or two middle items divided by two)
- Find the average age (sum of all items divided by their number)
- Find the range of the ages (max minus min)

INPUT:

```
1 # QUESTION 1
2 print("solution 1")
3 ages = [19, 22, 19, 24, 20, 25, 26, 24, 25, 24]
4 ages.sort()
5 print(ages)
6 print(min(ages))
7 print(max(ages))
8 ages.append(max(ages))
9 ages.append(min(ages))
10 print(ages)
11 ages.sort()
12 print(ages)
13 mid = len(ages) // 2
14 res = (ages[mid] + ages[~mid]) / 2
15 print("median of the list is :", res)
16 average = sum(ages) / len(ages)
17 print("average of the list is :", average)
18 range = max(ages) - min(ages)
19 print("range of the list is :", range)
```

Explanation:

- I have used list operations like sort(),min(),max(),append(),len(),sum() to write the above code in pycharm
- sort():it is used to get the given list items in a sorted order
- min() & max() : this operations are used to get the minimum and maximum values of a list
- append() : it is used to add data to the list
- len() : the length operation is used to get the total length of list
- sum(): it is used to get the sum of all the values/data in the list
- defined average as sum(ages)/len(ages)
- range as max(ages)-min(ages)
- median by dividing the two middle terms of the list
- By using all above operations I got the required output for the given question

OUTPUT:

```
Run ML 1
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 1.py"
[19, 19, 20, 22, 24, 24, 24, 25, 25, 26]
19
26
[19, 19, 20, 22, 24, 24, 24, 25, 25, 26, 26, 19]
[19, 19, 19, 20, 22, 24, 24, 24, 25, 25, 26, 26]
median of the list is : 24.0
average of the list is : 22.75
range of the list is : 7

Process finished with exit code 0
```

Question 2

INPUT:

```
ML 3.py ML 4.py ML 5.py ML 6.py ML 7.py ML 8.py ML 9.py ML 1.py ML 2.py
1 # QUESTION2
2 print("solution 2")
3 dog = {}
4 print(dog)
5 dog['name'] = 'denver'
6 dog['color'] = 'black'
7 dog['breed'] = 'labrador retriever'
8 dog['legs'] = 4
9 dog['age'] = 'one year'
10 print("dog_dictionary=", dog)
11 student = {'first_name': 'rahul', 'last_name': 'aleti', 'gender': 'male', 'age': '22', 'maratial status': 'single',
12            'skills': ['leadership', 'team work'], 'country': 'USA', 'city': 'NEW YORK', 'address': '7401 W 104'}
13 print("student_dictionary=", student)
14 print("the length of the student dictionary is: ", len(student))
15 student.get('skills')
16 student['skills'] = ['computer proficiency', 'communication skills']
17 print("student dictionary with updated skills is student=", student)
18 print(type(student['skills']))
19 keyslist = list(student.keys())
20 print("student keys as list: ", keyslist)
21 valueslist = list(student.values())
22 print("student values as list: ", valueslist)
```

Explanation:

- Created an empty dictionary dog using{ }
- Then added different keys and values to the dog dictionary
- Created a student dictionary and added keys specified in the question such as last name,first name,gender,address,city to the student

- Using the length operation(len()) go the total length of student dictionary
- Using dict.get() method I have generated the values of the skills key in student dict and then modified the values of the skills
- Using type() method I got the data type of skills values
- Using list() operation converted the keys and values of student into lists

OUTPUT:

```
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 2.py"
solution 2
{}
dog_dictionary= {'name': 'denver', 'color': 'black', 'breed': 'labrador retriever', 'legs': 4, 'age': 'one year'}
student_dictionary= {'first_name': 'rahul', 'last_name': 'aleti', 'gender': 'male', 'age': '22', 'maratial status': 'single', 'skills': ['leadership', 'team work'], 'country': 'U
the length of the student dictionary is: 9
student dictionary with updated skills is student= {'first_name': 'rahul', 'last_name': 'aleti', 'gender': 'male', 'age': '22', 'maratial status': 'single', 'skills': ['computer
<class 'list'>
student keys as list: ['first_name', 'last_name', 'gender', 'age', 'maratial status', 'skills', 'country', 'city', 'address']
student values as list: ['rahul', 'aleti', 'male', '22', 'single', ['computer proficiency', 'communication skills'], 'USA', 'NEW YORK', '7401 W 104']

Process finished with exit code 0
```

```
ship', 'team work'], 'country': 'USA', 'city': 'NEW YORK', 'address': '7401 W 104'}

: 'single', 'skills': ['computer proficiency', 'communication skills'], 'country': 'USA', 'city': 'NEW YORK', 'address': '7401 W 104'}

104']
```

QUESTION 3

INPUT:

```
1 # QUESTION 3
2 print("solution 3")
3 sisters = ("sam", "vinny", "dunny")
4 brothers = ("arun", "vijay", "arjun")
5 print(sisters)
6 print(brothers)
7 siblings = sisters + brothers
8 print(siblings)
9 print(len(siblings))
10 parents = ("ram", "seeta")
11 family_members = siblings + parents
12 print(family_members)
13
```

Explanation:

- Created brothers and sisters tuples using tuple()
- Joined brothers using + operator, and assigned it to siblings
- Got the length of siblings using len() operation.
- Created parents tuple and added to siblings then assigned that value to family_members.

OUTPUT:

```
ML5 x ML3 x
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 3.py"
solution 3
('sam', 'vinny', 'dunny')
('arun', 'vijay', 'arjun')
('sam', 'vinny', 'dunny', 'arun', 'vijay', 'arjun')
6
('sam', 'vinny', 'dunny', 'arun', 'vijay', 'arjun', 'ram', 'seeta')

Process finished with exit code 0
```

4. Question 4

INPUT:

```
print("solution 4")
it_companies = {'Facebook', 'Google', 'Microsoft', 'Apple', 'IBM', 'Oracle', 'Amazon'}
print("length of the it_companies is : ", len(it_companies))
it_companies.add('Twitter') # adding twitter
print(it_companies)
it_companies.update(['fisher', 'ford', 'verizon'])
print(it_companies)
it_companies.remove('Facebook') # removing facebook from it_companies
print(it_companies)
A = {19, 22, 24, 20, 25, 26}
B = {19, 22, 20, 25, 26, 24, 28, 27}
C = A.union(B) # joining A and B
print(C)
D = A.intersection(B)
print("A intersection B is:", D)
E = A.issubset(B)
print("is A subset of B:", E)
F = A.isdisjoint(B)
print("are A and B disjoint sets:", F)
G = A.update(B) # joining A with B
H = B.update(A) # joining B with A
print("joining A with B :", G)
print("joining B with A:", H)
I = A.symmetric_difference(B)
print("symmetric difference between A and B is:", I)
del A # deleting set A
del B # deleting set B
ages = [22, 19, 24, 25, 26, 24, 25, 24]
set1 = set(ages) # converting list as set
print(set1)
```

```

print(set1)
print(len(ages))
print(len(set1))
diff = len(ages) - len(set1)
print("the difference between length of list and sets is: ", diff)
# the difference between remove and discard is :If the item to remove does not exist in the set, remove() will raise an error,discard() will not raise an error.

```

Explanation:

- Using len() operation got the length of the set it_companies.
- Using set.add() added twitter and using set.remove() removed facebook from the set.
- Using update() inserted multiple companies to the set.
- the difference between remove and discard is :If the item to remove does not exist in the set, remove() will raise an error, discard() will not raise an error.
- Using union() operation joined A&B sets, using intersection() I got the intersection or common values in A&B sets.
- Using subset(), I checked whether A is subset of B. using disjoint() I checked whether A&B are disjoint sets.
- Using update() I joined A with B and B with A.
- Using symmetric_difference() I got the symmetric difference between A&B sets.
- Using del() I have completely deleted set A and set B.
- Using set(list) I converted list into set and compared the length of set and list.

OUTPUT:

```

ML 4 x
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 4.py"
solution 4
length of the it_companies is : 7
{'IBM', 'Oracle', 'Twitter', 'Apple', 'Microsoft', 'Facebook', 'Amazon', 'Google'}
{'fisher', 'IBM', 'Oracle', 'Twitter', 'Amazon', 'Google', 'verizon', 'Facebook', 'ford', 'Apple', 'Microsoft'}
{'fisher', 'IBM', 'Oracle', 'Twitter', 'Amazon', 'Google', 'verizon', 'ford', 'Apple', 'Microsoft'}
{19, 20, 22, 24, 25, 26, 27, 28}
A intersection B is: {19, 20, 22, 24, 25, 26}
is A subset of B: True
are A and B disjoint sets: False
joining A with B : None
joining B with A: None
symmetric difference between A and B is: set()
{19, 22, 24, 25, 26}
8
5
the difference between length of list and sets is: 3
Process finished with exit code 0

```

5. Question 5

INPUT:

```

print("solution 5")
radius = 30
pi = 3.14
area_of_circle = pi * radius ** 2
print("the area of circle with radius 30 is:", area_of_circle)
circumference_of_circle = 2 * pi * radius
print("the circumference of circle with radius 30 is:", circumference_of_circle)
# taking radius as user input
radius = float(input("enter the radius"))
area = pi * radius ** 2
print("the area of circle is:", area)

```

Explanation:

- With the given radius I have calculated the area of circle using formula $\text{area} = \pi * r^2$ and also circumference with formula $\text{circumference} = 2 * \pi * r$ and I have predefined the value of π as 3.14.
- In the latter half I calculated the area of circle with input radius from the user. Used `float()` method to return floating point number for provided radius.

OUTPUT:



```

ML 5 x
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 5.py"
solution 5
the area of circle with radius 30 is: 2826.0
the circumference of circle with radius 30 is: 188.4
enter the radius 5
the area of circle is: 78.5
Process finished with exit code 0

```

Here I gave the input radius $r=5$, which gave the final output for area of circle as 78.5.

6. Question 6

```

print("solution 6")
sentence = "I am a teacher and I love to inspire and teach people"
s = set(sentence.split(" "))
print(s)
print("unique words used in the sentence are:", len(s))

```

Explanation:

- Using split() and set () methods obtained the unique words in the given sentence and used len() operation to get the total number of unique words in the given sentence.

OUTPUT:

```
ML 5 x ML 6 x
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 6.py"
solution 6
{'love', 'and', 'am', 'inspire', 'a', 'I', 'teacher', 'teach', 'people', 'to'}
unique words used in the sentence are: 10
Process finished with exit code 0
```

7. Question 7

```
# QUESTION 7
print("solution 7")
a = 'Name'
b = 'Age'
c = 'Country'
d = 'City'
print(a, "\t", b, "\t", c, "\t", d)
e = 'Asabeneh'
f = 250
g = 'Finland'
h = 'Helsinki'
print(e, f, "\t", g, "\t", h)
```

Explanation:

- Used tab escape sequence (“\t”) to get the required output for the given strings.

OUTPUT:

```
ML 5 x ML 7 x
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 7.py"
solution 7
Name    Age    Country    City
Asabeneh 250    Finland    Helsinki

Process finished with exit code 0
```

8. Question 8

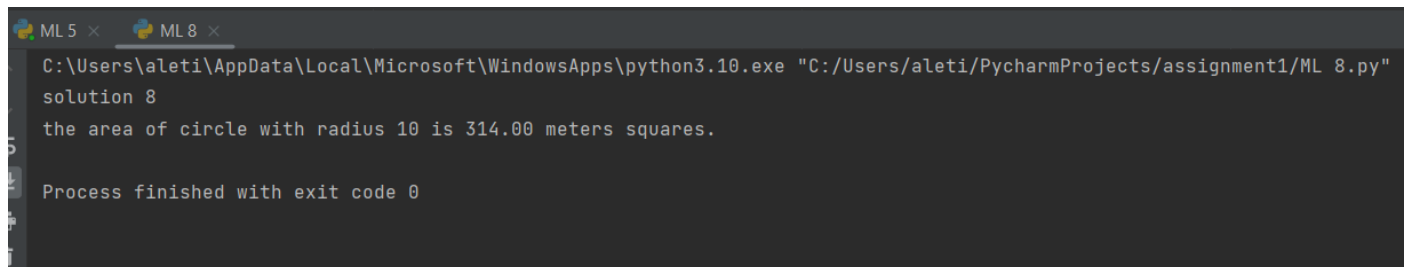
INPUT:

```
print("solution 8")
radius = 10
area = 3.14 * (float(radius) ** 2)
print("the area of circle with radius " + str(radius) + " is" + " {0:.2f}".format(area) + " meters squares.")
```

Explanation:

- Used string formatting method I have inserted the values radius and area in the pre-defined text

OUTPUT:



```
ML 5 x ML 8 x
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 8.py"
solution 8
the area of circle with radius 10 is 314.00 meters squares.

Process finished with exit code 0
```

Here we gave the radius as 10 which gave the final output as 314.00.

9. Question 9

INPUT:

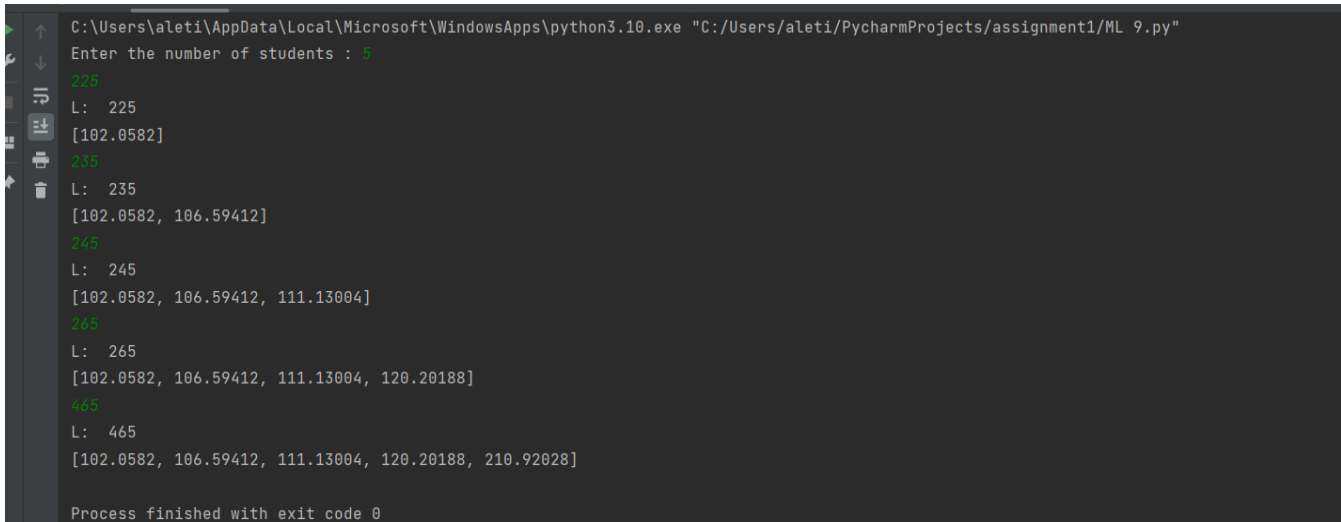
```
L = []
kilos = []
N = int(input("Enter the number of students : "))
for i in range(0, N):
    pounds = int(input())
    kilograms = pounds * 0.453592
    L.append(pounds) # adding weights to the list
    kilos.append(kilograms)
print("L: ", pounds)
print(kilos)
```

Explanation:

- I have created two empty lists one for L(pounds) and other for kilos.

- Used int() function which converts specified value into an integer and used built in input() function to take integer input from the user.
- To convert the weights from pounds to kilograms used **for loop**
- To convert lbs into kilos I have used the formula kilograms = pounds* 0.453592.
- Used append() operator to add kilograms and pounds to the empty lists

OUTPUT:



```
C:\Users\aleti\AppData\Local\Microsoft\WindowsApps\python3.10.exe "C:/Users/aleti/PycharmProjects/assignment1/ML 9.py"
Enter the number of students : 5
225
L: 225
[102.0582]
235
L: 235
[102.0582, 106.59412]
245
L: 245
[102.0582, 106.59412, 111.13004]
265
L: 265
[102.0582, 106.59412, 111.13004, 120.20188]
465
L: 465
[102.0582, 106.59412, 111.13004, 120.20188, 210.92028]
Process finished with exit code 0
```

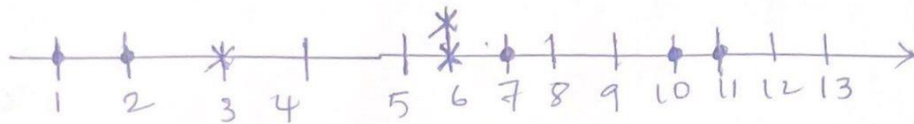
In the output I gave user input of no. of student as 5 and also gave their respective weights in pounds which are then converted into kilograms.

10. Question 10

Question -10

Solution:-

Given data,



where we have 8 data points and 2 classes
let us consider two classes as Class A, Class B

Class A	Class B
1	0
2	0
0	3
0	0
0	0
0	6
0	6
7	0
0	0
0	0
10	0
11	0
0	0
0	0

→ Training

→ Testing

We need calculate the distance from each testing data set to training data set

$$\text{Euclidean distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$10) \sqrt{(7-1)^2 + (0)^2}$$

$$1) = \sqrt{(6)^2} = \underline{6}$$

$$2) \sqrt{(0-1)^2 + (0)^2} = \sqrt{(1)^2} = \underline{1}$$

$$3) \sqrt{(0-1)^2 + (0)^2} = \underline{1}$$

$$4) \sqrt{(10-1)^2 + (0)^2} = \sqrt{(9)^2} = \underline{9}$$

$$5) \sqrt{(11-1)^2 + (0)^2} = \underline{10}$$

$$6) \sqrt{(0-1)^2 + (0)^2} = \sqrt{(1)^2} = \underline{1}$$

$$7) \sqrt{(0-1)^2 + (0)^2} = \sqrt{(1)^2} = \underline{1}$$

We got the following
6 distances between class 4
data points = $[6, 1, 1, 9, 10, 1, 1]$

$$II) 1) \sqrt{(7-2)^2 + (0)^2} = \underline{5}$$

$$2) \sqrt{(0-2)^2 + (0)^2} = \underline{2}$$

$$4) \sqrt{(10-2)^2 + (0)^2} = \underline{8}$$

$$5) \sqrt{(0-2)^2 + (0)^2} = \underline{2}$$

$$5) \sqrt{(11-2)^2 + (0)^2} = \underline{9}$$

$$6) \sqrt{(0-2)^2 + (0)^2} = \underline{2}$$

$$7) \sqrt{(0-2)^2 + (0)^2} = \underline{2}$$

$$II: [5, 2, 8, 2, 9, 2, 2]$$

$$III) 1) \sqrt{(7-0)^2 + (0)^2} = \underline{7}$$

$$2) \sqrt{(0-0)^2 + (0)^2} = \underline{0}$$

$$3) \underline{0}$$

$$4) \sqrt{(10-0)^2 + (0)^2} = \underline{10}$$

$$5) \sqrt{(11-0)^2 + (0)^2} = \underline{11}$$

$$6) \underline{6}$$

$$7) \underline{6}$$

$$\text{Total distances} = [7, 0, 0, 11, 6, 6]$$

$$IV) 1) \underline{7}$$

$$3) + 3$$

$$2) \sqrt{(0-0)^2 + (0-3)^2} = \sqrt{(4)^2} = \underline{3}$$

$$4) \sqrt{(10)^2 + (3)^2} = \sqrt{100+9} = \sqrt{109} = 10.44$$

⑤

$$\sqrt{11^2 - (3)^2}$$

$$= \sqrt{121 - 9}$$

$$= \sqrt{130}$$

$$= 11.40$$

⑥ -3

⑦ -3

7, +3, +3, 10.40, 11.40, +3, +3

① -7

② 0

③ 0

④ 10

⑤ 11

⑥ 6

⑦ 6

7, 0, 0, 10, 11, 6, 6

7, 0, 0, 10, 11, 6, 6

⑧ $\sqrt{7^2 + 6^2}$

$$= \sqrt{49 + 36}$$

$$= 9.21$$

② 6

③ 6

④ $\sqrt{10^2 + 6^2}$

$$= \sqrt{136}$$

$$= 11.66$$

⑤ $\sqrt{11^2 + 6^2}$

$$= \sqrt{157}$$

$$= 12.52$$

⑥ 6, ⑦ 6

9.21, 6, 6, 11.66, 12.52, 6, 6

2 classes

8 - data points

feature

1	1	3	training
2	2		
3			
4			
5		66	testing
6			
7	7		
8			
9			
10	10		
11	11		
12			
13			
f	yes	no	

$$\text{Precision} = \frac{TP}{(TP + FP)}$$

$$\text{Precision} = \frac{2}{2+1}$$

$$= \frac{2}{3}$$

$$\boxed{\text{Precision} = 0.66}$$

$$\text{Specificity} = \frac{TN}{TN + FP}$$

$$= \frac{2}{2+3}$$

$$= \frac{2}{5}$$

$$\boxed{\text{Specificity} = 0.4}$$

actual

C ₁ - yes	1, 2 TP	7, 10, 11 FN
C ₂ - NO	3 FP	6, 6 TN
	3	

$$\text{accuracy} = \frac{TP + TN}{a_u}$$

$$\text{accuracy} = \frac{2+2}{8} = \frac{1}{2} = 0.5$$

acc

GITHUB:

Repository Url for the source code : [rahul-700742994/MACHINE-LEARNING-ASSIGNMENT-1-700742994-\(github.com\)](https://github.com/rahul-700742994/MACHINE-LEARNING-ASSIGNMENT-1-700742994)

Zoom Recording:

https://drive.google.com/file/d/1VsuGtYKBFHAgB8eslmhadGQ-a5_Mz-zJ/view?usp=sharing