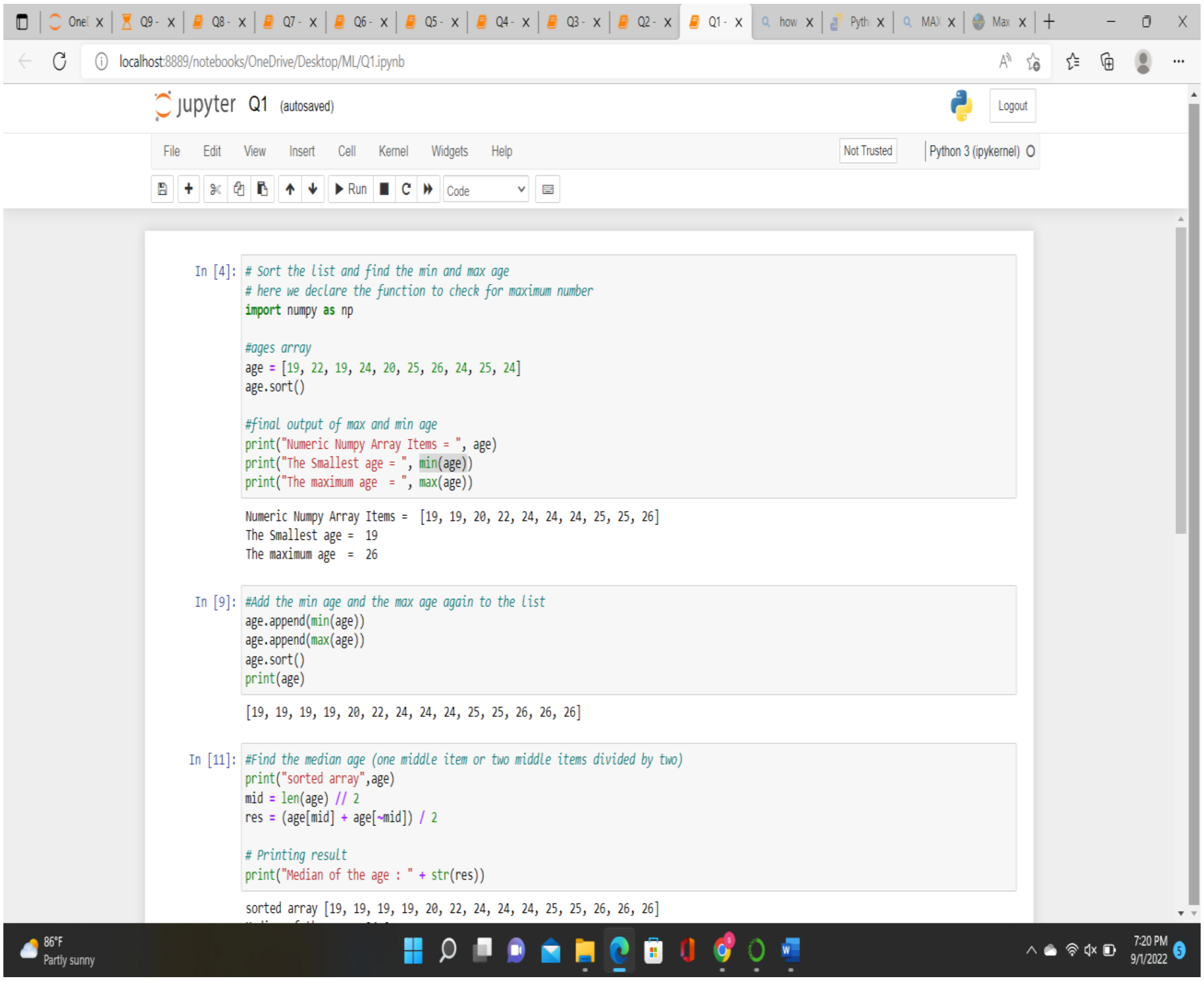
MACHINE LEARNING (ASSIGNMENT - 1)


localhost:8889/notebooks/OneDrive/Desktop/ML/Q1.ipynb
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```
In [4]: # Sort the list and find the min and max age
        # here we declare the function to check for maximum number
        import numpy as np

        #ages array
        age = [19, 22, 19, 24, 20, 25, 26, 24, 25, 24]
        age.sort()

        #final output of max and min age
        print("Numeric Numpy Array Items = ", age)
        print("The Smallest age = ", min(age))
        print("The maximum age  = ", max(age))
```

```
Numeric Numpy Array Items =  [19, 19, 20, 22, 24, 24, 24, 25, 25, 26]
The Smallest age =  19
The maximum age  =  26
```

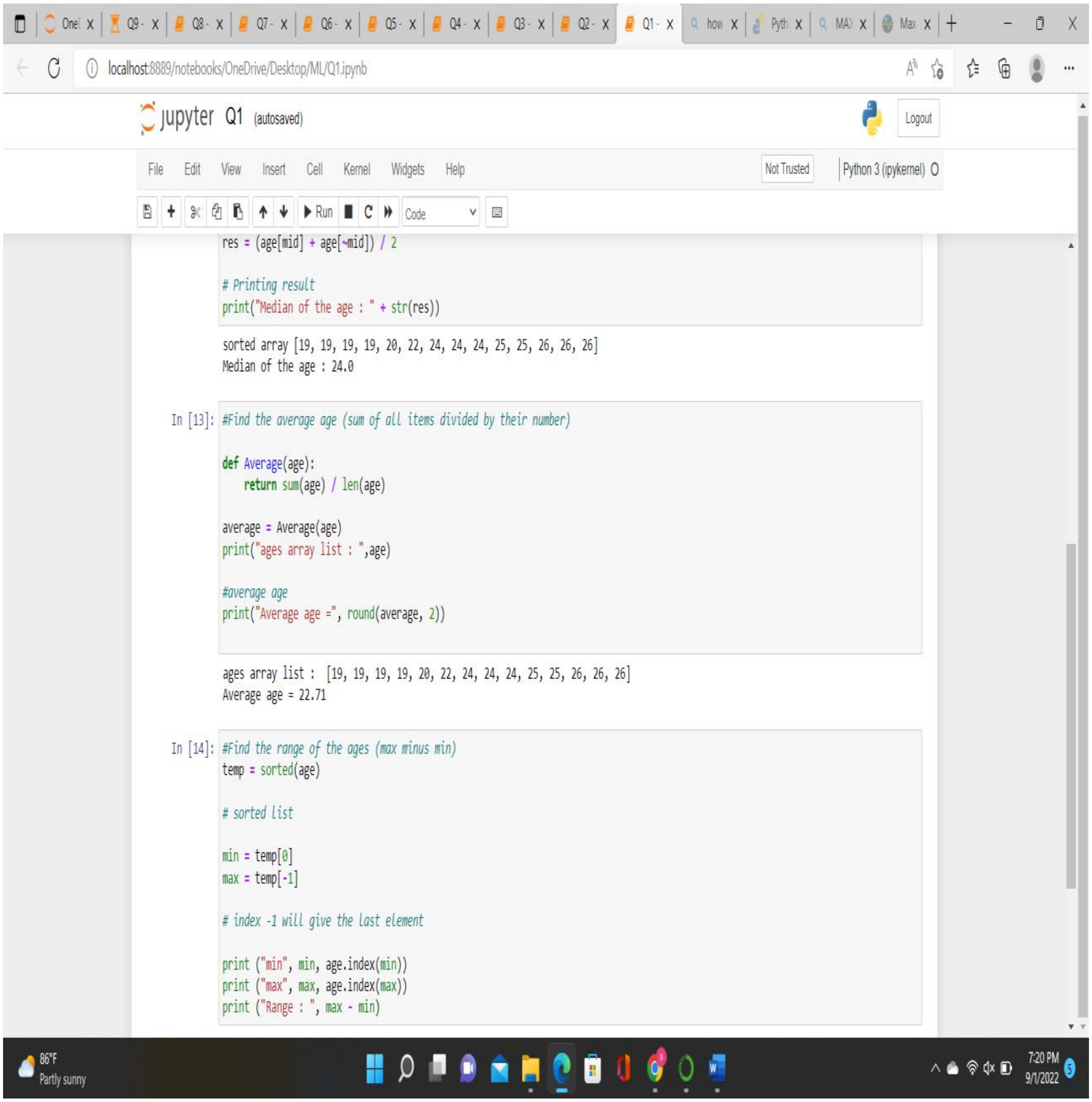
```
In [9]: #Add the min age and the max age again to the list
        age.append(min(age))
        age.append(max(age))
        age.sort()
        print(age)
```

```
[19, 19, 19, 19, 20, 22, 24, 24, 24, 25, 25, 26, 26, 26]
```

```
In [11]: #Find the median age (one middle item or two middle items divided by two)
         print("sorted array",age)
         mid = len(age) // 2
         res = (age[mid] + age[~mid]) / 2

         # Printing result
         print("Median of the age : " + str(res))
```

```
sorted array [19, 19, 19, 19, 20, 22, 24, 24, 24, 25, 25, 26, 26, 26]
```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```
res = (age[mid] + age[~mid]) / 2

# Printing result
print("Median of the age : " + str(res))
```

```
sorted array [19, 19, 19, 19, 20, 22, 24, 24, 24, 25, 25, 26, 26, 26]
Median of the age : 24.0
```

```
In [13]: #Find the average age (sum of all items divided by their number)

def Average(age):
    return sum(age) / len(age)

average = Average(age)
print("ages array list : ",age)

#average age
print("Average age =", round(average, 2))
```

```
ages array list :  [19, 19, 19, 19, 20, 22, 24, 24, 24, 25, 25, 26, 26, 26]
Average age = 22.71
```

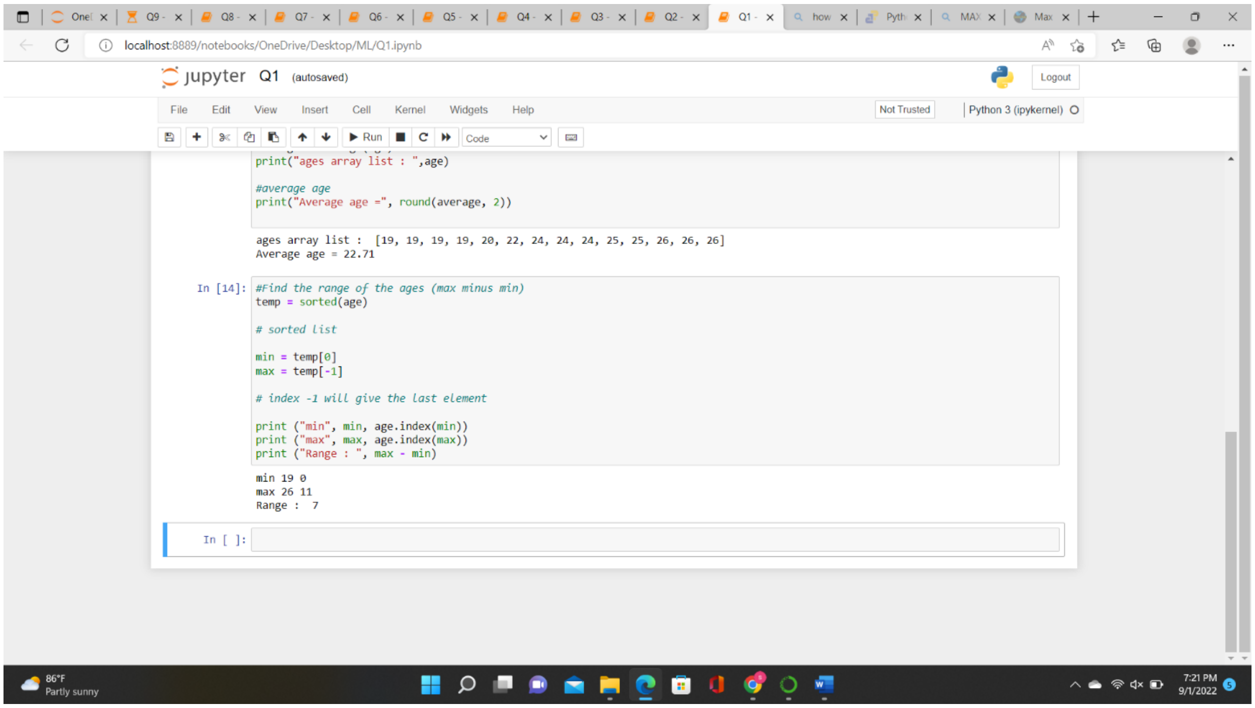
```
In [14]: #Find the range of the ages (max minus min)
temp = sorted(age)

# sorted list

min = temp[0]
max = temp[-1]

# index -1 will give the last element

print ("min", min, age.index(min))
print ("max", max, age.index(max))
print ("Range : ", max - min)
```



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```
print("ages array list : ",age)

#average age
print("Average age =", round(average, 2))
```

```
ages array list :  [19, 19, 19, 19, 20, 22, 24, 24, 24, 25, 25, 26, 26, 26]
Average age = 22.71
```

```
In [14]: #Find the range of the ages (max minus min)
temp = sorted(age)

# sorted list

min = temp[0]
max = temp[-1]

# index -1 will give the last element

print ("min", min, age.index(min))
print ("max", max, age.index(max))
print ("Range : ", max - min)
```

```
min 19 0
max 26 11
Range :  7
```

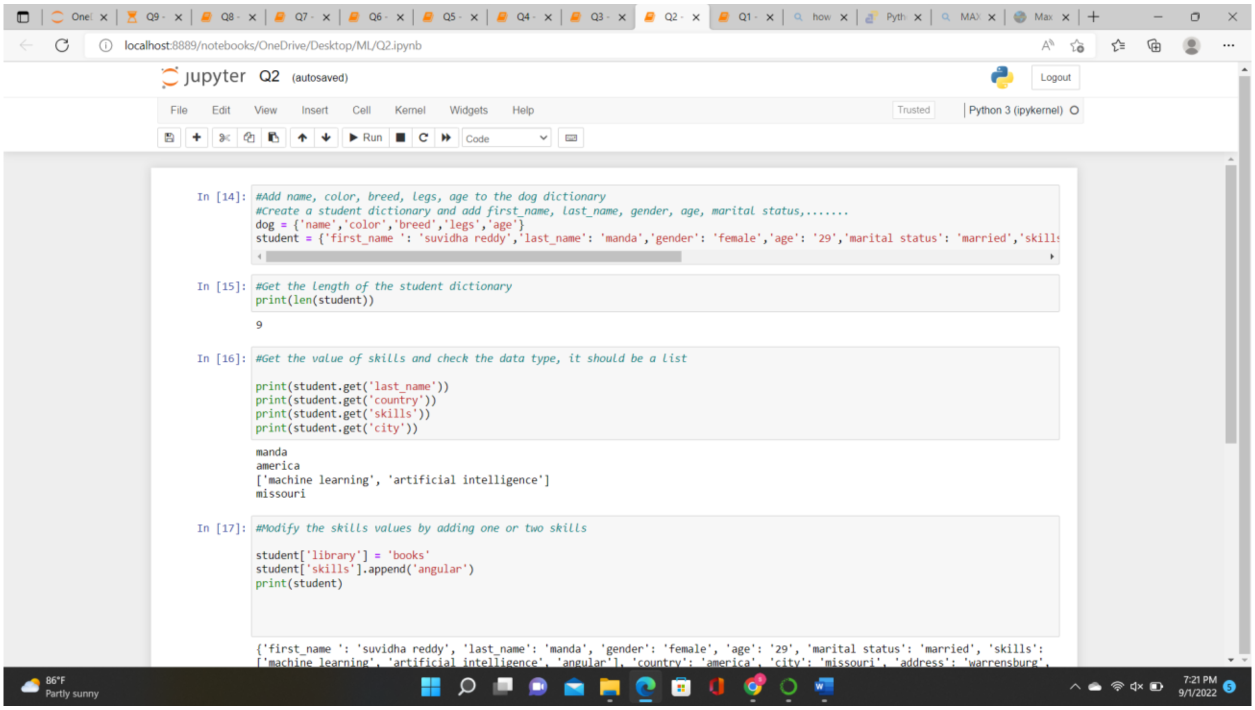
```
In [ ]:
```

1. Square brackets are used to build lists.

2. Indexed list items can be accessed by using the index number, and negative indexing implies to start at the end.

3. Use the append() method to add a new item to the list's end.

4. The list will be sorted by default using the alphabetic, ascending, Sort() technique.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```
In [14]: #Add name, color, breed, legs, age to the dog dictionary
         #Create a student dictionary and add first_name, last_name, gender, age, marital status,.......
         dog = {'name','color','breed','legs','age'}
         student = {'first_name ': 'suvidha reddy','last_name': 'manda','gender': 'female','age': '29','marital status': 'married','skills

In [15]: #Get the length of the student dictionary
         print(len(student))

         9

In [16]: #Get the value of skills and check the data type, it should be a list

         print(student.get('last_name'))
         print(student.get('country'))
         print(student.get('skills'))
         print(student.get('city'))

         manda
         america
         ['machine learning', 'artificial intelligence']
         missouri

In [17]: #Modify the skills values by adding one or two skills

         student['library'] = 'books'
         student['skills'].append('angular')
         print(student)

         {'first_name ': 'suvidha reddy', 'last_name': 'manda', 'gender': 'female', 'age': '29', 'marital status': 'married', 'skills':
         ['machine learning', 'artificial intelligence', 'angular'], 'country': 'america', 'city': 'missouri', 'address': 'warrensburg',
```

1. Square brackets are used to build lists.

2. Indexed list items can be accessed by using the index number, and negative indexing implies to start at the end.

3. Use the append() method to add a new item to the list's end.

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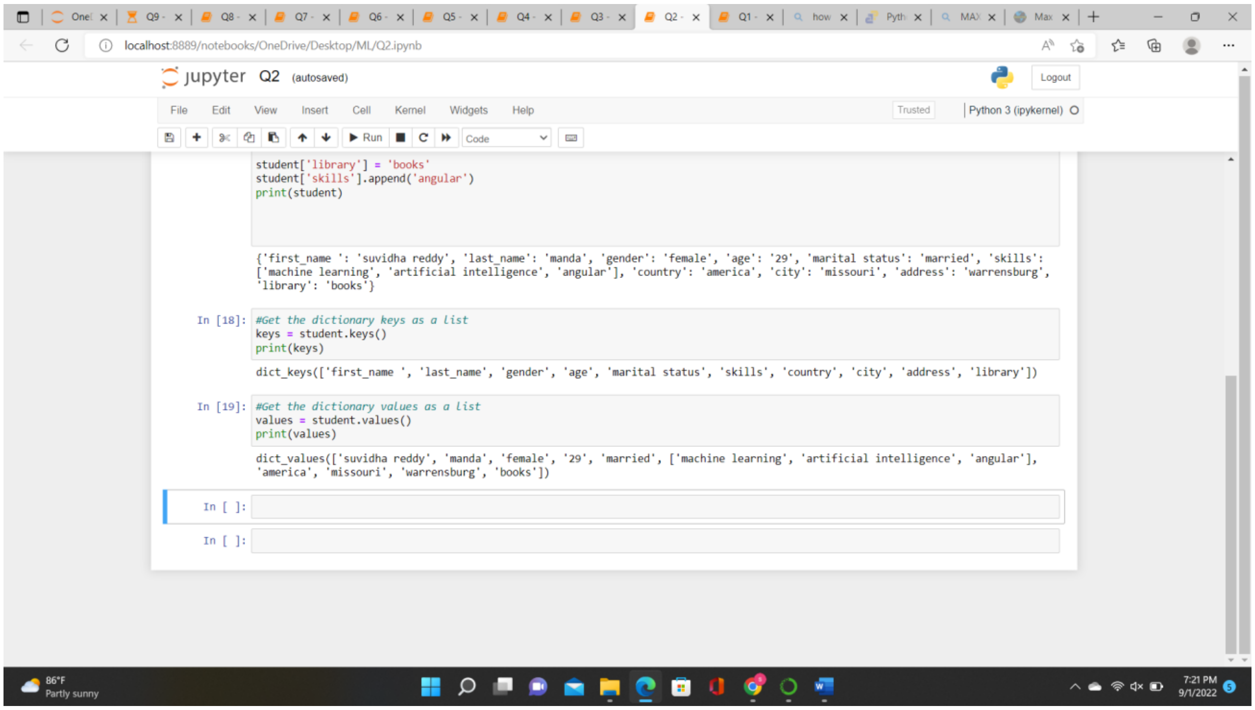
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```
student['library'] = 'books'
student['skills'].append('angular')
print(student)
```

```
{'first_name ': 'suvidha reddy', 'last_name': 'manda', 'gender': 'female', 'age': '29', 'marital status': 'married', 'skills':
['machine learning', 'artificial intelligence', 'angular'], 'country': 'america', 'city': 'missouri', 'address': 'warrensburg',
'library': 'books'}
```

```
In [18]: #Get the dictionary keys as a list
keys = student.keys()
print(keys)
```

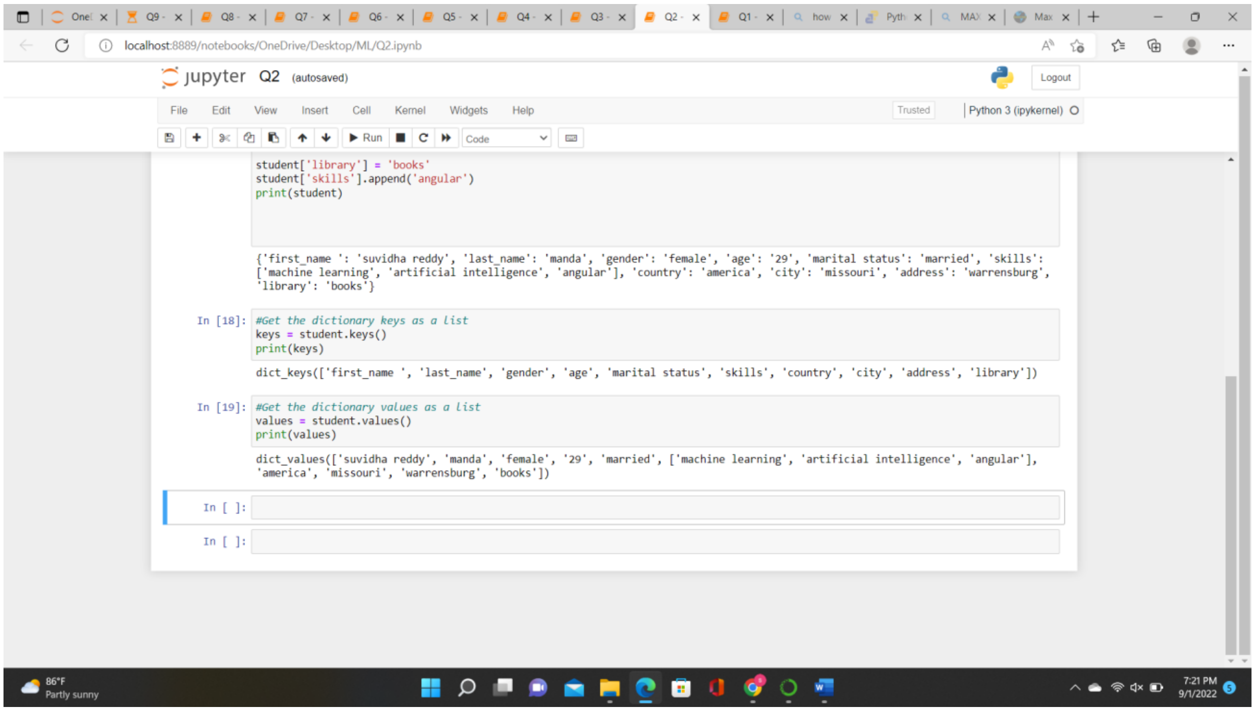
```
dict_keys(['first_name ', 'last_name', 'gender', 'age', 'marital status', 'skills', 'country', 'city', 'address', 'library'])
```

```
In [19]: #Get the dictionary values as a list
values = student.values()
print(values)
```

```
dict_values(['suvidha reddy', 'manda', 'female', '29', 'married', ['machine learning', 'artificial intelligence', 'angular'],
'america', 'missouri', 'warrensburg', 'books'])
```

```
In [ ]:
```

```
In [ ]:
```



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```
student['library'] = 'books'
student['skills'].append('angular')
print(student)
```

```
{'first_name ': 'suvidha reddy', 'last_name': 'manda', 'gender': 'female', 'age': '29', 'marital status': 'married', 'skills':
['machine learning', 'artificial intelligence', 'angular'], 'country': 'america', 'city': 'missouri', 'address': 'warrensburg',
'library': 'books'}
```

```
In [18]: #Get the dictionary keys as a list
keys = student.keys()
print(keys)
```

```
dict_keys(['first_name ', 'last_name', 'gender', 'age', 'marital status', 'skills', 'country', 'city', 'address', 'library'])
```

```
In [19]: #Get the dictionary values as a list
values = student.values()
print(values)
```

```
dict_values(['suvidha reddy', 'manda', 'female', '29', 'married', ['machine learning', 'artificial intelligence', 'angular'],
'america', 'missouri', 'warrensburg', 'books'])
```

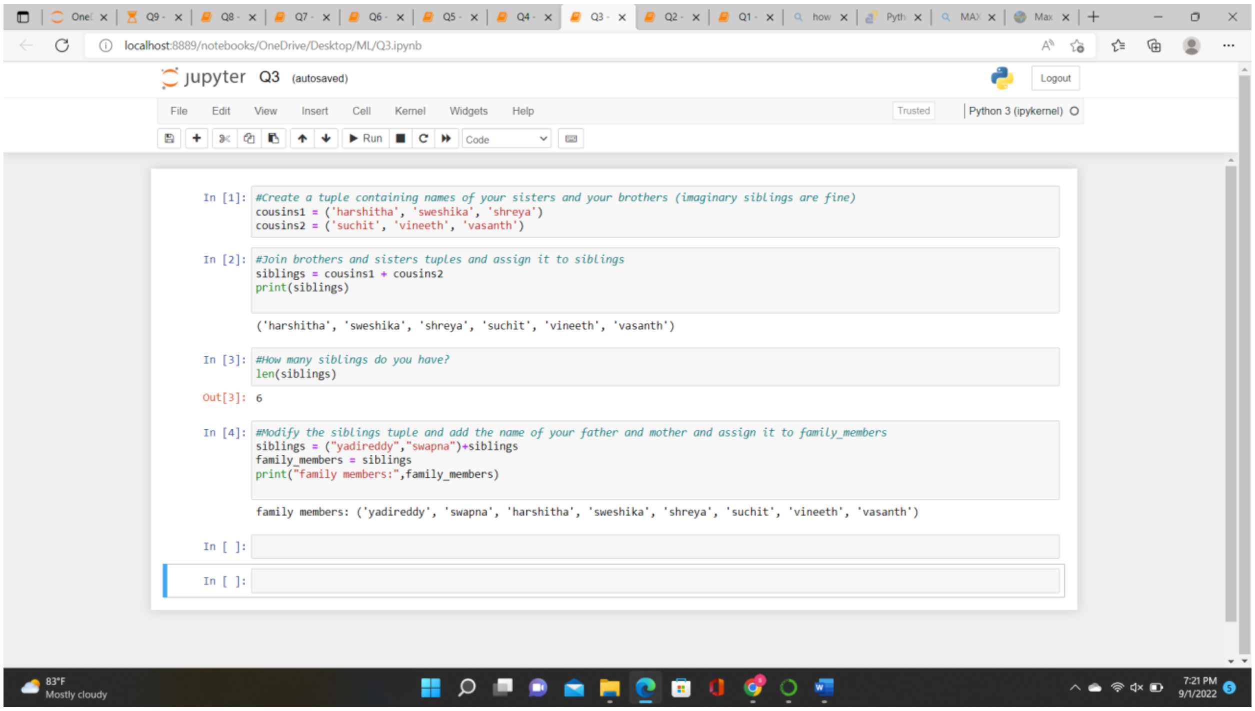
```
In [ ]:
```

```
In [ ]:
```

1. Curly brackets are used for writing in dictionaries, which also have keys and values.

2. Data values are kept as key:value pairs in dictionaries. A dictionary can be updated and does not accept duplicate entries.

3. To determine the length of the dictionary, use len().

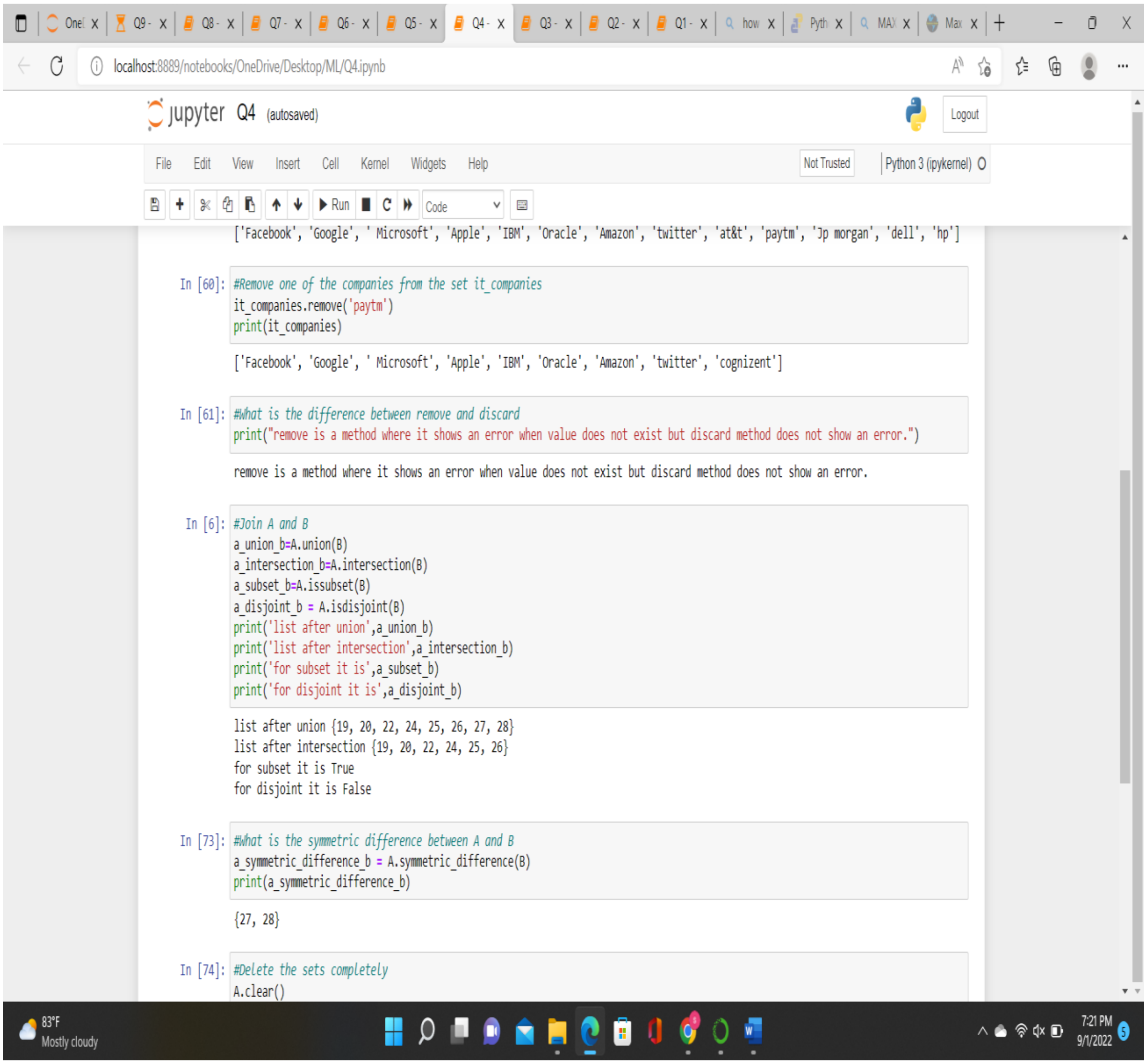


```
In [1]: #Create a tuple containing names of your sisters and your brothers (imaginary siblings are fine)
        cousins1 = ('harshitha', 'sweshika', 'shreya')
        cousins2 = ('suchit', 'vineeth', 'vasanth')

In [2]: #Join brothers and sisters tuples and assign it to siblings
        siblings = cousins1 + cousins2
        print(siblings)

        ('harshitha', 'sweshika', 'shreya', 'suchit', 'vineeth', 'vasanth')

In [3]: #How many siblings do you have?
        len(siblings)

Out[3]: 6

In [4]: #Modify the siblings tuple and add the name of your father and mother and assign it to family_members
        siblings = ("yadireddy","swapna")+siblings
        family_members = siblings
        print("family members:",family_members)

        family members: ('yadireddy', 'swapna', 'harshitha', 'sweshika', 'shreya', 'suchit', 'vineeth', 'vasanth')

In [ ]:

In [ ]:
```

1. A tuple is an unchanging, ordered collection.

2. Round brackets are used for writing tuples.

3. You can use the + operator to connect two or more tuples together.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```
['Facebook', 'Google', ' Microsoft', 'Apple', 'IBM', 'Oracle', 'Amazon', 'twitter', 'at&t', 'paytm', 'Jp morgan', 'dell', 'hp']
```

```
In [60]: #Remove one of the companies from the set it_companies
         it_companies.remove('paytm')
         print(it_companies)
```

```
['Facebook', 'Google', ' Microsoft', 'Apple', 'IBM', 'Oracle', 'Amazon', 'twitter', 'cognizent']
```

```
In [61]: #What is the difference between remove and discard
         print("remove is a method where it shows an error when value does not exist but discard method does not show an error.")
```

```
remove is a method where it shows an error when value does not exist but discard method does not show an error.
```

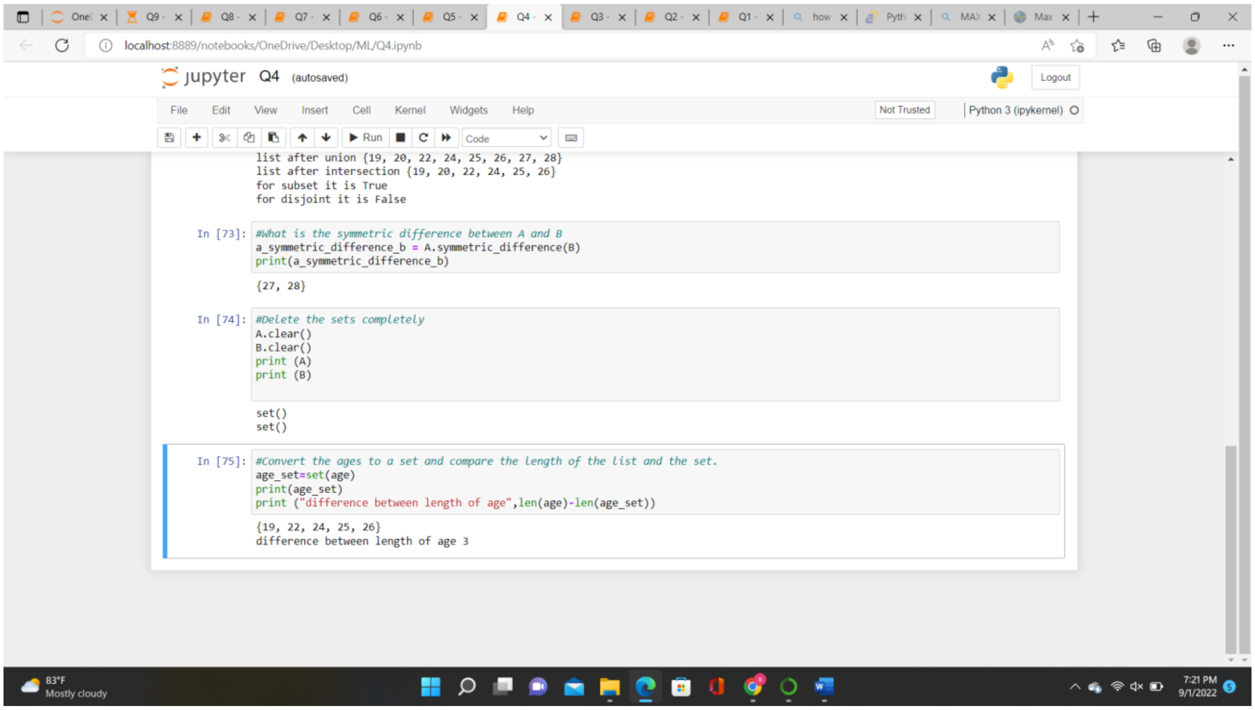
```
In [6]: #Join A and B
        a_union_b=A.union(B)
        a_intersection_b=A.intersection(B)
        a_subset_b=A.issubset(B)
        a_disjoint_b = A.isdisjoint(B)
        print('list after union',a_union_b)
        print('list after intersection',a_intersection_b)
        print('for subset it is',a_subset_b)
        print('for disjoint it is',a_disjoint_b)
```

```
list after union {19, 20, 22, 24, 25, 26, 27, 28}
list after intersection {19, 20, 22, 24, 25, 26}
for subset it is True
for disjoint it is False
```

```
In [73]: #What is the symmetric difference between A and B
         a_symmetric_difference_b = A.symmetric_difference(B)
         print(a_symmetric_difference_b)
```

```
{27, 28}
```

```
In [74]: #Delete the sets completely
         A.clear()
```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Python 3 (ipykernel)
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```
list after union {19, 20, 22, 24, 25, 26, 27, 28}
list after intersection {19, 20, 22, 24, 25, 26}
for subset it is True
for disjoint it is False
```

```
In [73]: #What is the symmetric difference between A and B
         a_symmetric_difference_b = A.symmetric_difference(B)
         print(a_symmetric_difference_b)

         {27, 28}
```

```
In [74]: #Delete the sets completely
         A.clear()
         B.clear()
         print (A)
         print (B)

         set()
         set()
```

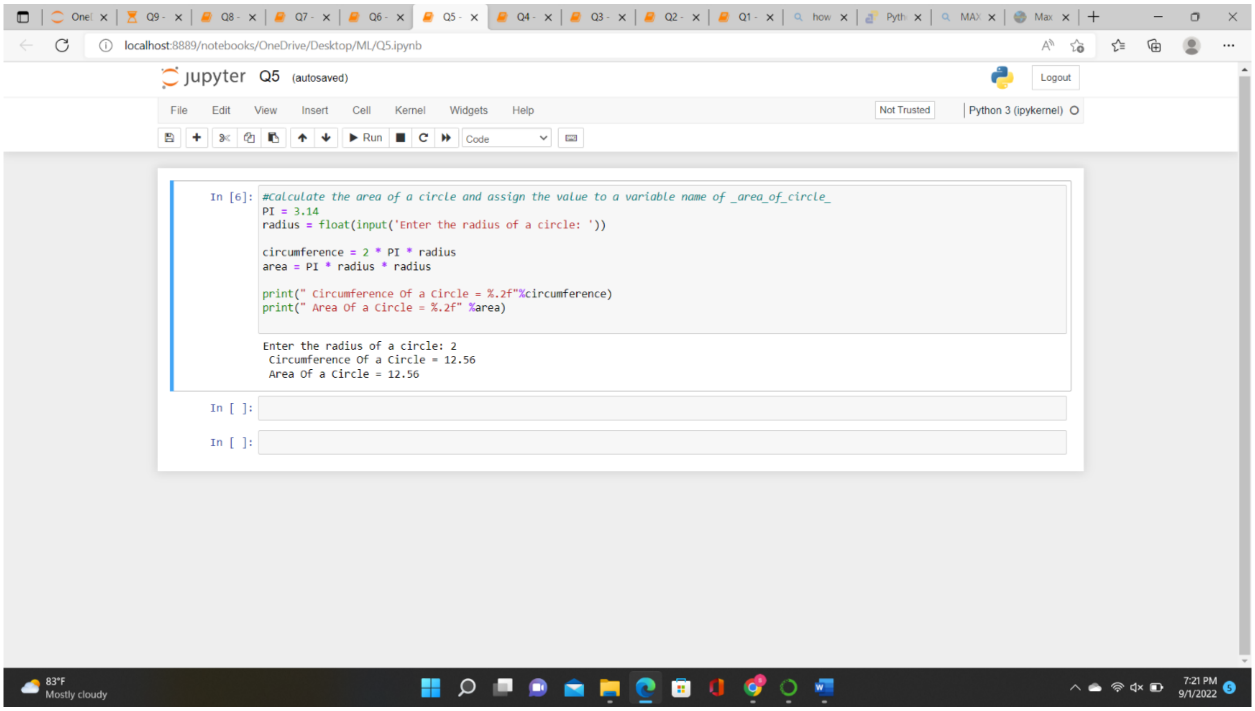
```
In [75]: #Convert the ages to a set and compare the length of the list and the set.
         age_set=set(age)
         print(age_set)
         print ("difference between length of age",len(age)-len(age_set))

         {19, 22, 24, 25, 26}
         difference between length of age 3
```

1. Curly brackets are used to denote sets, which are collections that are unsorted, immutable, and unindexed.

2. Use the add() method to add one item to a set, and Use the update() method to include elements from another set in the current set.

3. Use the remove() or discard() method to remove a component from a set.

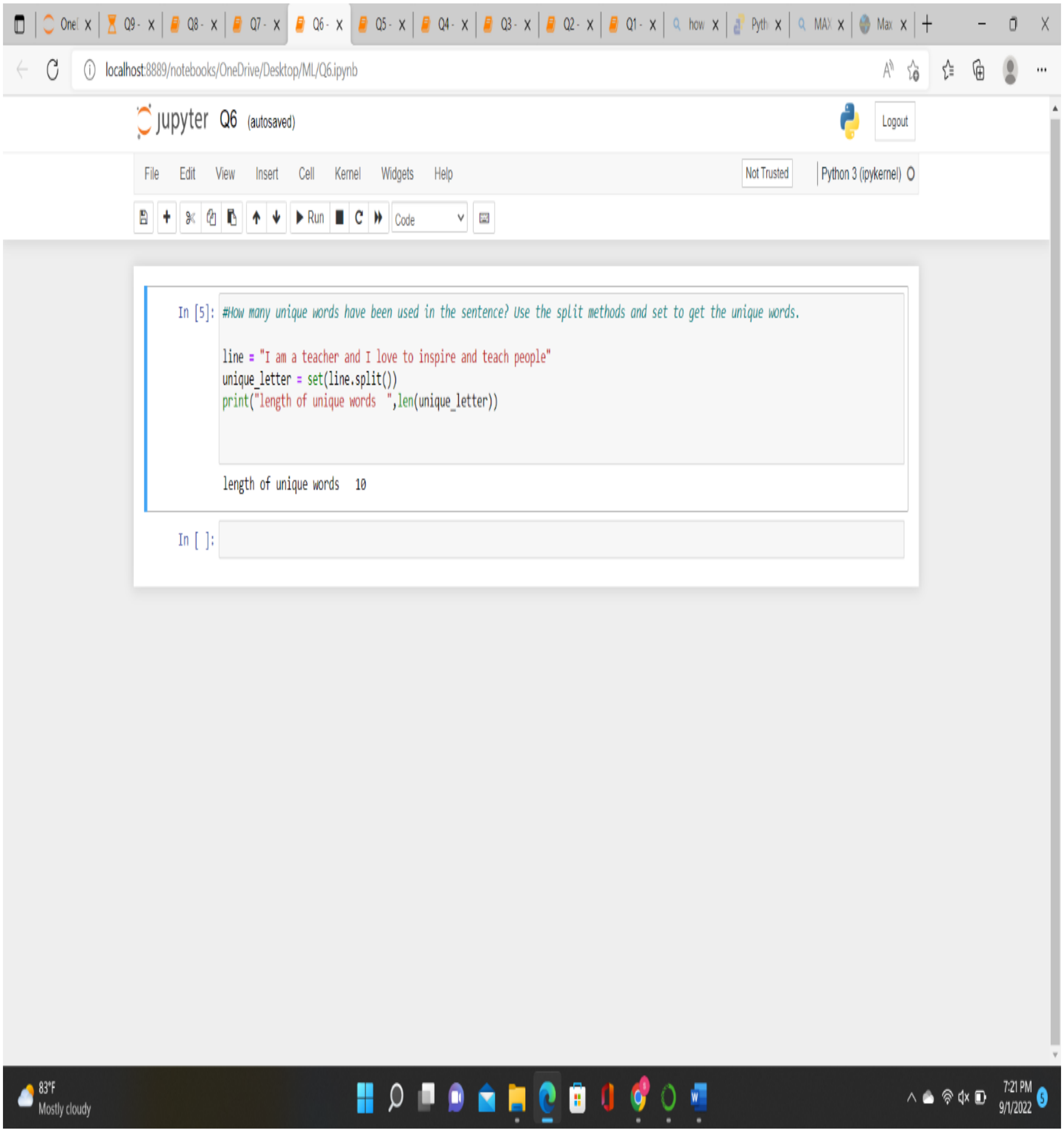
4. When a value doesn't exist, the delete method raises an error, but the discard method doesn't.



```
In [6]: #Calculate the area of a circle and assign the value to a variable name of _area_of_circle_
        PI = 3.14
        radius = float(input('Enter the radius of a circle: '))

        circumference = 2 * PI * radius
        area = PI * radius * radius

        print(" Circumference Of a Circle = %.2f"%circumference)
        print(" Area Of a Circle = %.2f" %area)

        Enter the radius of a circle: 2
         Circumference Of a Circle = 12.56
         Area Of a Circle = 12.56

In [ ]:

In [ ]:
```

1. All items from both sets are included in the set returned by union(); duplicate items are not included. intersection() generates a set of items that are present in both sets A and B. return from subset If set y contains every item in set x, then isdisjoint() returns true. True if there are no items from set x in set y. symmentric difference() return a set that excludes things that are in both sets and includes all items from both sets.

2. The set will be fully deleted using the del keyword.



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Code

```
In [5]: #How many unique words have been used in the sentence? Use the split methods and set to get the unique words.

        line = "I am a teacher and I love to inspire and teach people"
        unique_letter = set(line.split())
        print("length of unique words  ",len(unique_letter))

        length of unique words   10

In [ ]:
```

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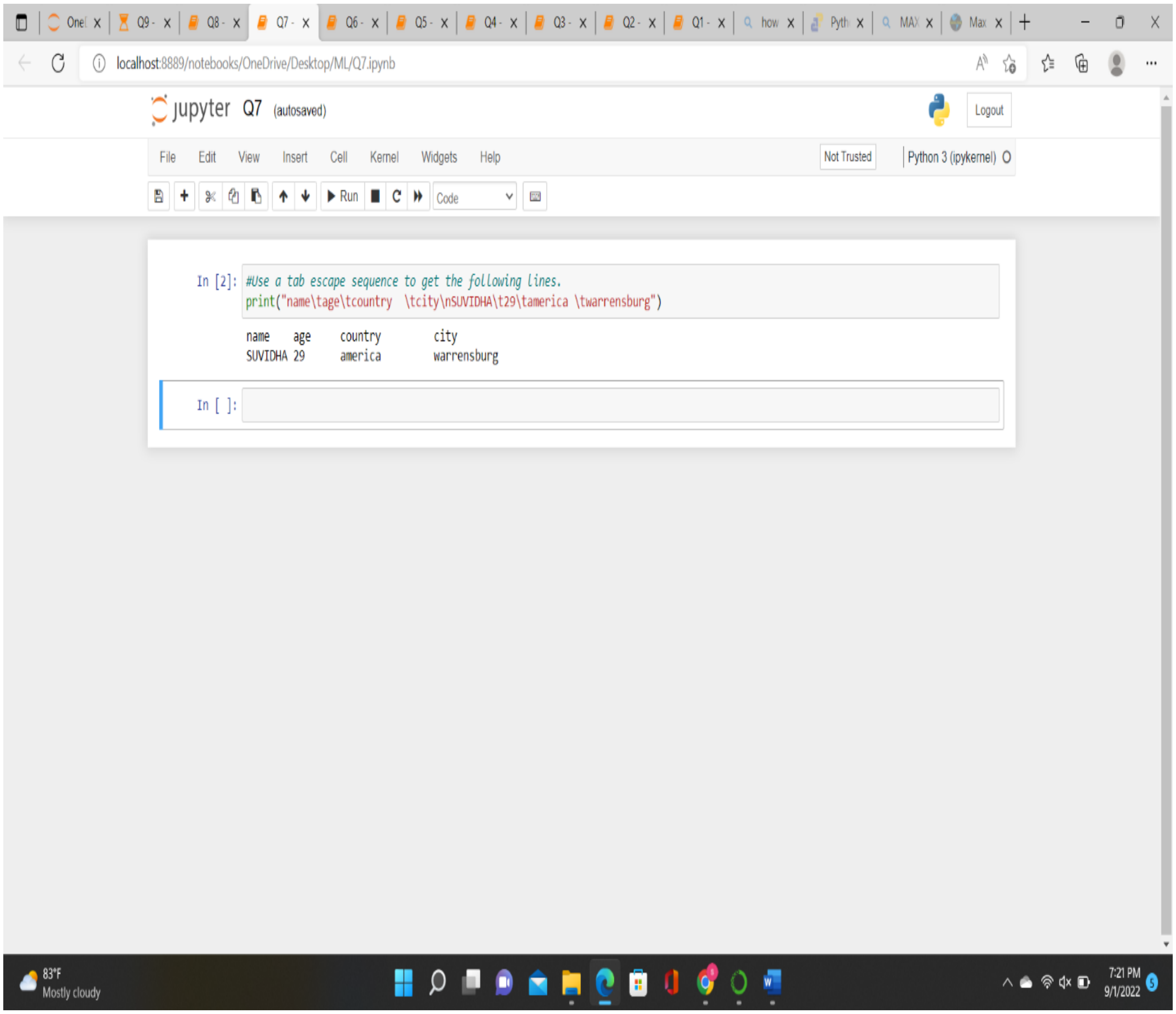
1. The user can provide the separator; the default separator is any whitespace. This will split the string into a list with each word acting as a list item.

\\,



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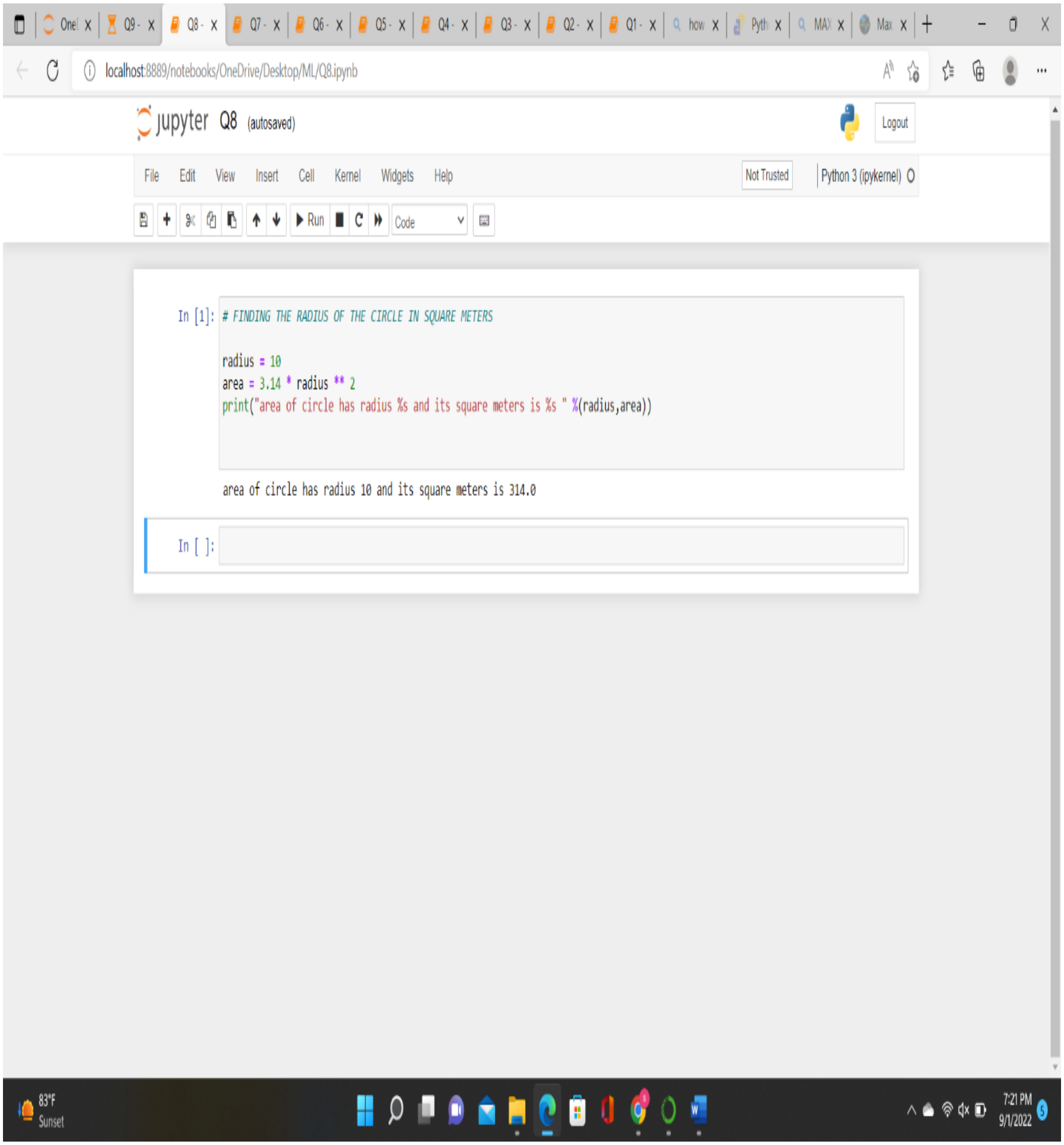
```
In [2]: #Use a tab escape sequence to get the following lines.
        print("name\tage\tcountry  \tcity\nSUVIDHA\t29\tamerica \twarrensburg")

        name    age     country         city
        SUVIDHA 29      america         warrensburg

In [ ]:
```

1. Use an escape character to inserted prohibited characters into a string.

2. Backslashes and the character you want to insert are considered escape characters.

3. \t stands for tab space, and \n stands for new line.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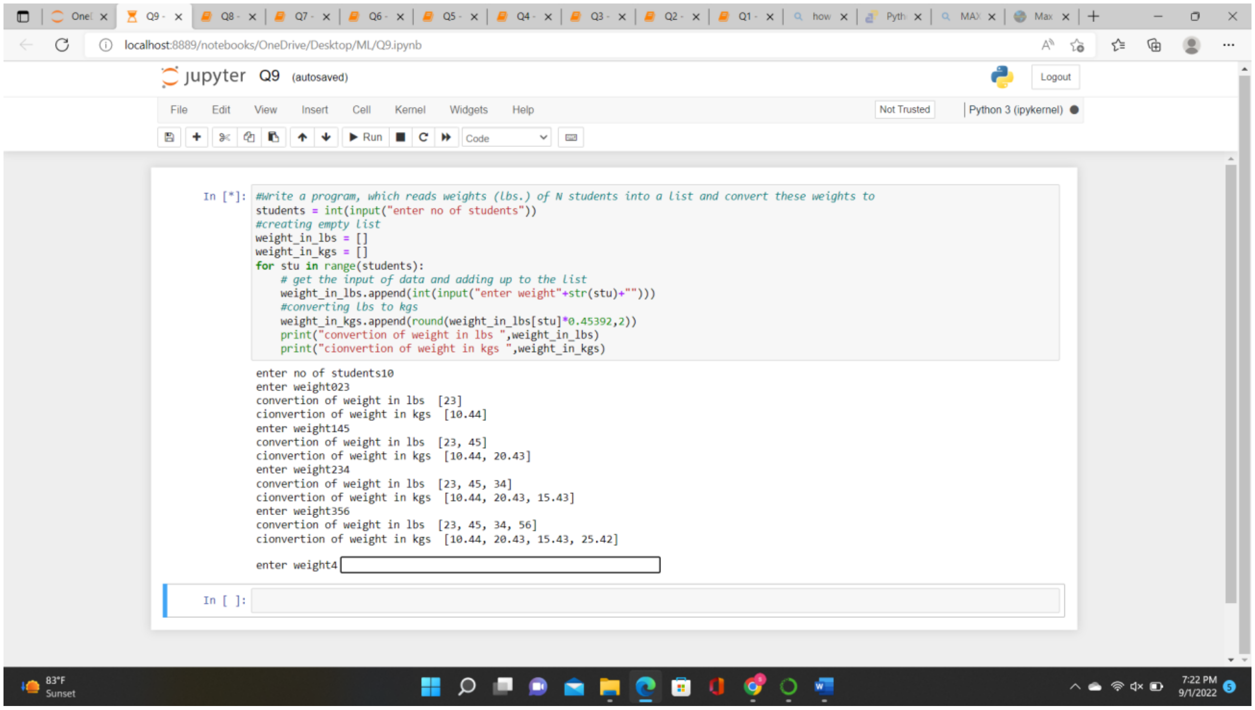
```
In [1]: # FINDING THE RADIUS OF THE CIRCLE IN SQUARE METERS

        radius = 10
        area = 3.14 * radius ** 2
        print("area of circle has radius %s and its square meters is %s " %(radius,area))

        area of circle has radius 10 and its square meters is 314.0

In [ ]:
```

1. String substitution is a function of the % operator for strings in Python.



In [*]:
```
#Write a program, which reads weights (lbs.) of N students into a list and convert these weights to
students = int(input("enter no of students"))
#creating empty list
weight_in_lbs = []
weight_in_kgs = []
for stu in range(students):
    # get the input of data and adding up to the list
    weight_in_lbs.append(int(input("enter weight"+str(stu)+"")))
    #converting lbs to kgs
    weight_in_kgs.append(round(weight_in_lbs[stu]*0.45392,2))
    print("convertion of weight in lbs ",weight_in_lbs)
    print("cionvertion of weight in kgs ",weight_in_kgs)
```

```
enter no of students10
enter weight023
convertion of weight in lbs  [23]
cionvertion of weight in kgs  [10.44]
enter weight145
convertion of weight in lbs  [23, 45]
cionvertion of weight in kgs  [10.44, 20.43]
enter weight234
convertion of weight in lbs  [23, 45, 34]
cionvertion of weight in kgs  [10.44, 20.43, 15.43]
enter weight356
convertion of weight in lbs  [23, 45, 34, 56]
cionvertion of weight in kgs  [10.44, 20.43, 15.43, 25.42]

enter weight4
```

In [ ]:

1. The /% operator for strings in Python does string substitution.

2. After doing the calculations to convert the student weights from pounds to kilograms, we will iterate the for loop an additional N times before collecting the students' weights in pounds and storing them in a list.

10) 1) Dividing data equally into 2 parts

1, 2, 3, 7 as training and

6, 6, 10, 11 as testing

KNN classifier - for $K=3$

Euclidean distance $d=\sqrt{(w-w_1)^2+(h-h_1)^2}$

distance from 6 to 1, 2, 3, 7 is

$$\left.\begin{array}{l} d_1=\sqrt{(6-1)^2}=5 \\ d_2=\sqrt{(6-2)^2}=4 \\ d_3=\sqrt{(6-3)^2}=3 \\ d_4=\sqrt{(6-7)^2}=1 \end{array}\right\} \begin{array}{c} \cdot \\ x \\ \cdot \end{array}$$

As there are maximum no. of (.), 6 is changed from x to

distance from 10 to 1, 2, 3, 7 is

$$\left.\begin{array}{l} d_1=\sqrt{(10-1)^2}=9 \\ d_2=\sqrt{(10-2)^2}=8 \\ d_3=\sqrt{(10-3)^2}=7 \\ d_4=\sqrt{(10-7)^2}=3 \end{array}\right\} \begin{array}{c} \cdot \\ x \\ \cdot \end{array}$$

As there are maximum no. of (.), 10 is not changed.

It is . to .

distance from 11 to 1, 2, 3, 7 is

$$\left.\begin{array}{l} d_1=\sqrt{(11-1)^2}=10 \\ d_2=\sqrt{(11-2)^2}=9 \\ d_3=\sqrt{(11-3)^2}=8 \\ d_4=\sqrt{(11-4)^2}=4 \end{array}\right\} \begin{array}{c} \cdot \\ x \\ \cdot \end{array}$$

As there ~~is~~ are maximum no. of (·), there is no change, · is same as ·

Confusion matrix -

	0	1
0	TN(0)	FP(2)
1	FN(0)	TP(2)

Accuracy - $\frac{(TP+TN)}{(P+N)} = \frac{2+0}{2+2} = \frac{2}{4} = 0.5$

Sensitivity - $\frac{TP}{(TP+FN)} = \frac{2}{2+0} = 1$

Specificity - $\frac{TN}{(FP+TN)} = \frac{0}{2+0} = 0$.