MACHINE LEARNING ASSIGNMENT – 01

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QUESTION-01

```
# 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 tw
o)
# • Find the average age (sum of all items divided by their number)
# • Find the range of the ages (max minus min)

ages = [19, 22, 19, 24, 20, 25, 26, 24, 25, 24]
ages.sort()
print("The List after sorting",ages)
max_age = max(ages)
print("The maximum age is ",max_age)
min_age = min(ages)
print("The minimum age is ",min_age )
ages.append(max_age)
ages.append(min_age)
print("The updated list is ",ages)
mid_value = len(ages) // 2
median = (ages[mid_value] + ages[~mid_value]) / 2
print("The median is ",median)
avg = sum(ages)/len(ages)
print("The average is ", round(avg,2))
range = max(ages)-min(ages)
print("The range is ",range)
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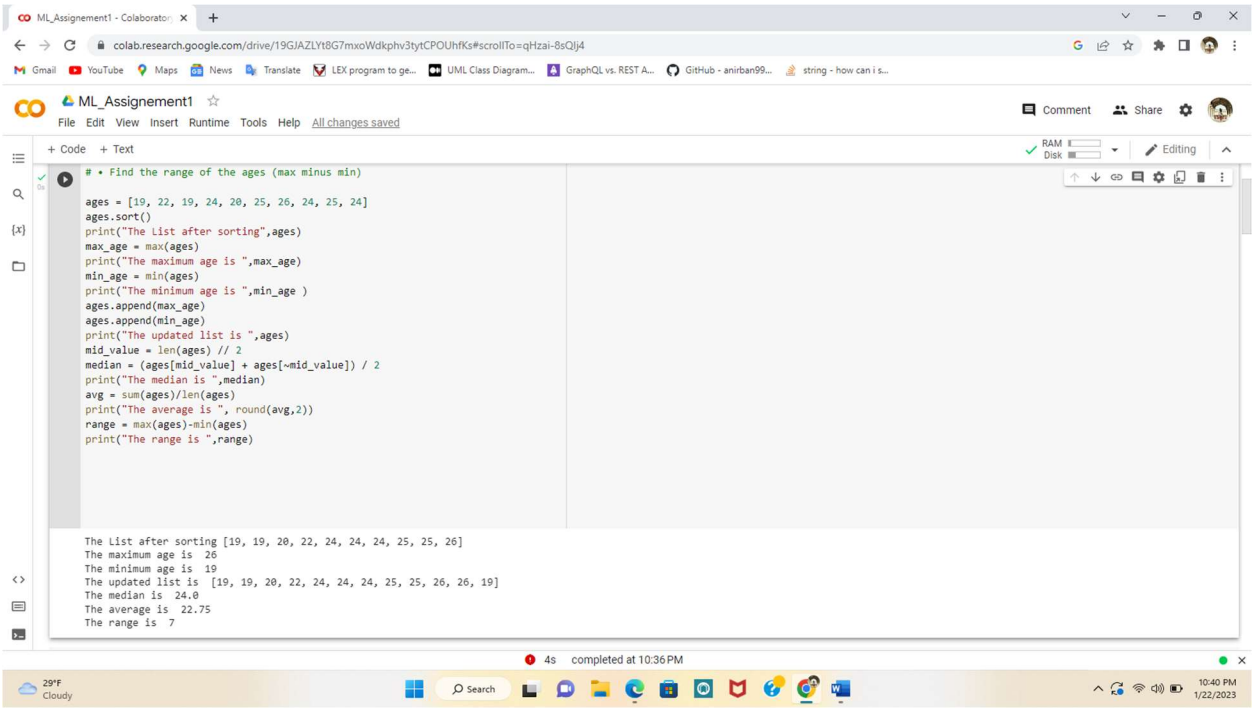

In this I have created a list of ages and performed the mentioned things in the question like sorting and finding min, max, adding using appending, finding range median etc by using the simple inbuilt methods in python.

```
# Question 2
# • Create an empty dictionary called dog
# • Add name, color, breed, legs, age to the dog dictionary
# • Create a student dictionary and add first_name, last_name, gender, age
, marital status,
# skills, country, city and address as keys for the dictionary
# • Get the length of the student dictionary
# • Get the value of skills and check the data type, it should be a list
# • Modify the skills values by adding one or two skills
# • Get the dictionary keys as a list
# • Get the dictionary values as a list

dog = {}
dog["name"] = "maxie"
dog["color"] = "brown"
dog["breed"] = "golden doodle"
dog["legs"] = "short"
dog["age"] = "5"

student = {}
student["first_name"] = "Praveena"
```

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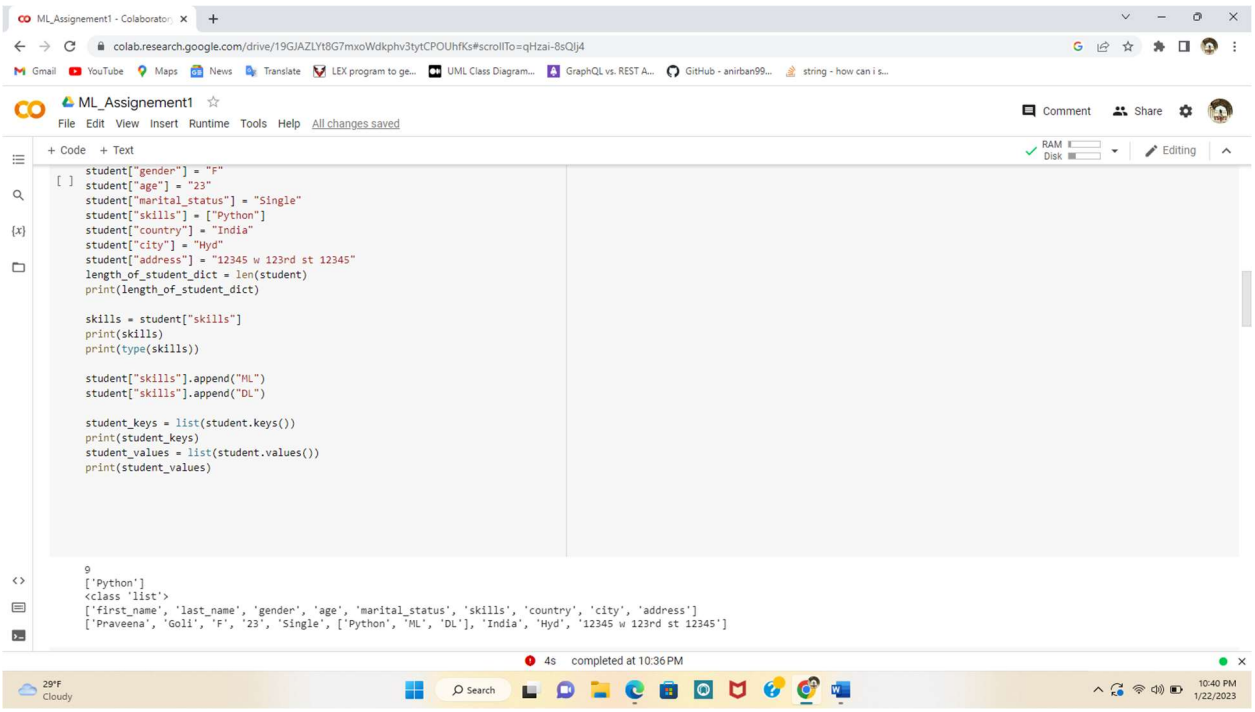
student["last_name"] = "Goli"
student["gender"] = "F"
student["age"] = "23"
student["marital_status"] = "Single"
student["skills"] = ["Python"]
student["country"] = "India"
student["city"] = "Hyd"
student["address"] = "12345 w 123rd st 12345"
length_of_student_dict = len(student)
print(length_of_student_dict)

skills = student["skills"]
print(skills)
print(type(skills))

student["skills"].append("ML")
student["skills"].append("DL")

student_keys = list(student.keys())
print(student_keys)
student_values = list(student.values())
print(student_values)
```



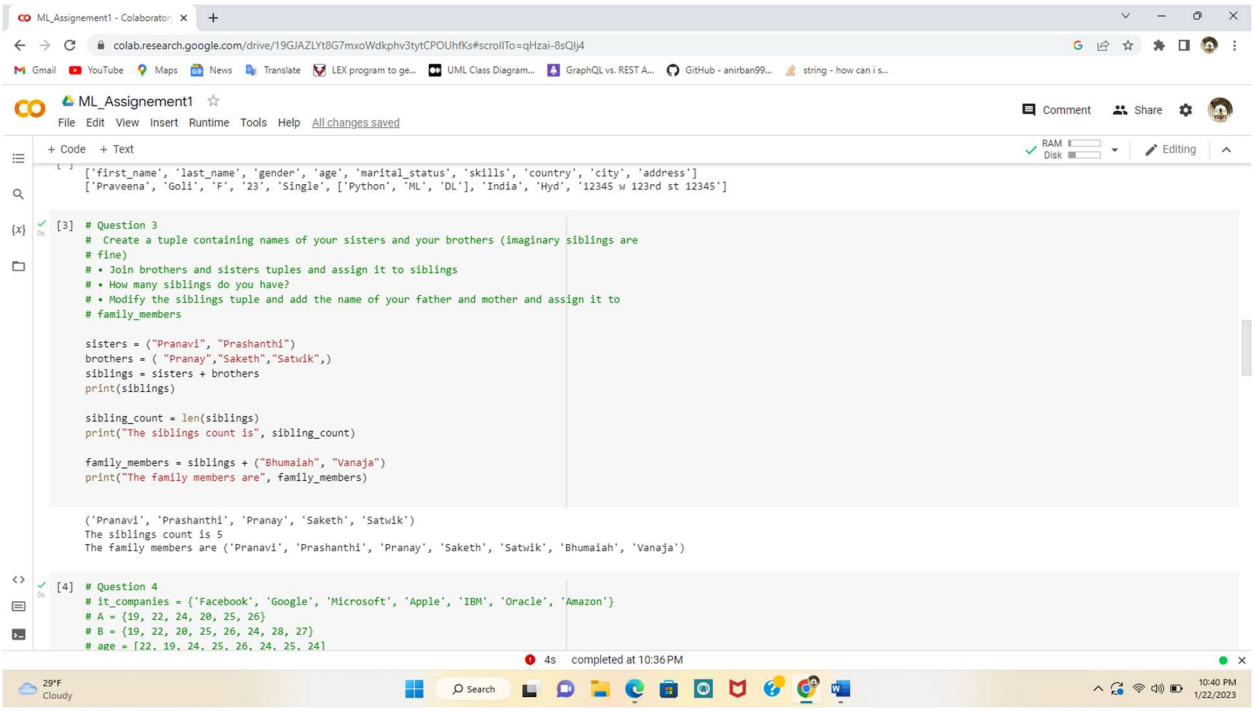
Here in the second question I have created the dictionary named dog and student and added the mentioned attributes for dog and student dictionaries and also found length of the particular dictionary using len and also found particular attribute value from the dictionary and it's data type in the form of list. Added some extra attribute values by using append. And printed the dictionary keys and values.

```
# Question 3
#  Create a tuple containing names of your sisters and your brothers (imag
inary siblings are
# fine)
# • Join brothers and sisters tuples and assign it to siblings
# • How many siblings do you have?
# • Modify the siblings tuple and add the name of your father and mother a
nd assign it to
# family_members

sisters = ("Pranavi", "Prashanthi")
brothers = ( "Pranay","Saketh","Satwik",)
siblings = sisters + brothers
print(siblings)

sibling_count = len(siblings)
print("The siblings count is", sibling_count)

family_members = siblings + ("Bhumaiah", "Vanaja")
print("The family members are", family_members)
```

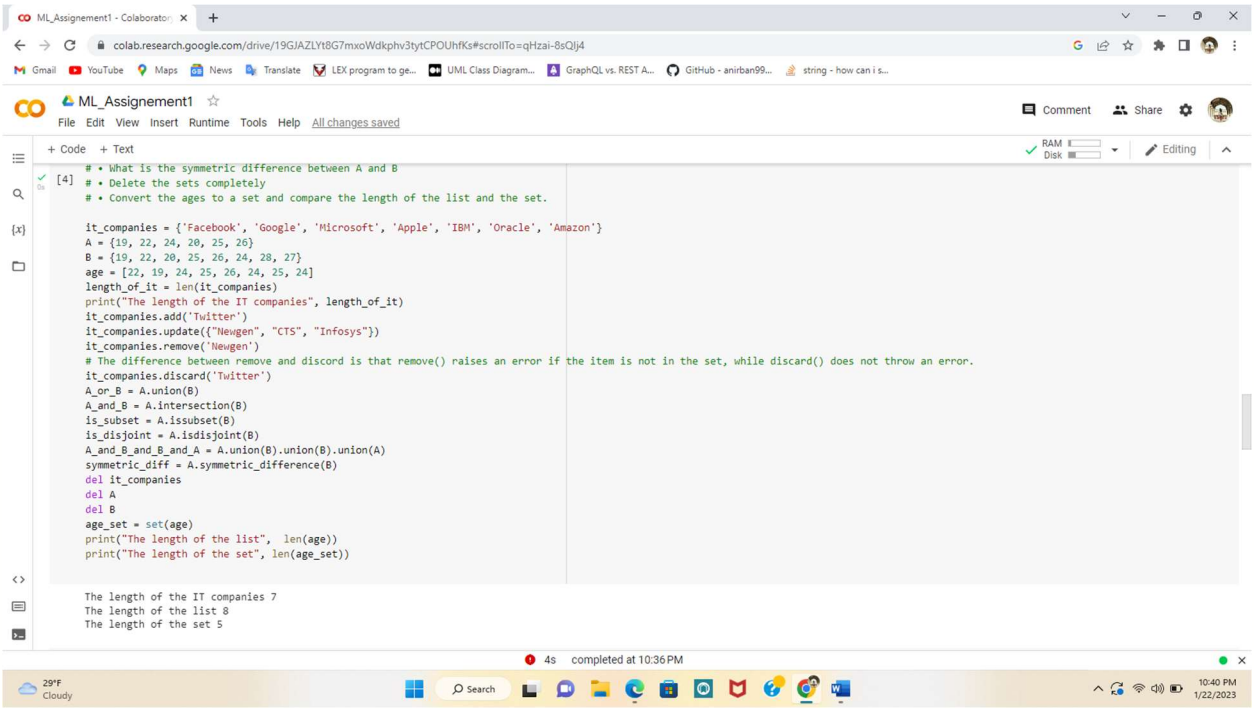


Here in third question, created a tuple sisters and brothers and joined using '+' as siblings and found length and modified the tuple and added extra relations like father and mother as family members and printed them.

```
# Question 4
# it_companies = {'Facebook', 'Google', 'Microsoft', 'Apple', 'IBM', 'Orac
le', 'Amazon'}
# A = {19, 22, 24, 20, 25, 26}
# B = {19, 22, 20, 25, 26, 24, 28, 27}
# age = [22, 19, 24, 25, 26, 24, 25, 24]
# • Find the length of the set it_companies
# • Add 'Twitter' to it_companies
# • Insert multiple IT companies at once to the set it_companies
# • Remove one of the companies from the set it_companies
# • What is the difference between remove and discard
# • Join A and B
# • Find A intersection B
# • Is A subset of B
# • Are A and B disjoint sets
# • Join A with B and B with A
# • What is the symmetric difference between A and B
# • Delete the sets completely
```

```
# • Convert the ages to a set and compare the length of the list and the s
et.

it_companies = {'Facebook', 'Google', 'Microsoft', 'Apple', 'IBM', 'Oracle
', 'Amazon'}
A = {19, 22, 24, 20, 25, 26}
B = {19, 22, 20, 25, 26, 24, 28, 27}
age = [22, 19, 24, 25, 26, 24, 25, 24]
length_of_it = len(it_companies)
print("The length of the IT companies", length_of_it)
it_companies.add('Twitter')
it_companies.update({"Newgen", "CTS", "Infosys"})
it_companies.remove('Newgen')
# The difference between remove and discord is that remove() raises an err
or if the item is not in the set, while discard() does not throw an error.
it_companies.discard('Twitter')
A_or_B = A.union(B)
A_and_B = A.intersection(B)
is_subset = A.issubset(B)
is_disjoint = A.isdisjoint(B)
A_and_B_and_B_and_A = A.union(B).union(B).union(A)
symmetric_diff = A.symmetric_difference(B)
del it_companies
del A
del B
age_set = set(age)
print("The length of the list",  len(age))
print("The length of the set", len(age_set))
```



Here in the fourth question, performed operations like union intersection subset disjoint and also performed symmetric difference etc in the sets.

```
# Question 5
# The radius of a circle is 30 meters.
# • Calculate the area of a circle and assign the value to a variable name
 of _area_of_circle_
# • Calculate the circumference of a circle and assign the value to a vari
able name of
# _circum_of_circle_
# • Take radius as user input and calculate the area

import math
radius = 30
_area_of_circle_ = math.pi * radius ** 2
print(_area_of_circle_)
_circum_of_circle_ = 2 * math.pi * radius
print(_circum_of_circle_)

#Take radius as user input and calculate the area
radius = float(input("Enter the radius of the circle in meters: "))
area = math.pi * radius ** 2
print("The area of the circle is: ", area)
circum = 2 * math.pi * radius
```

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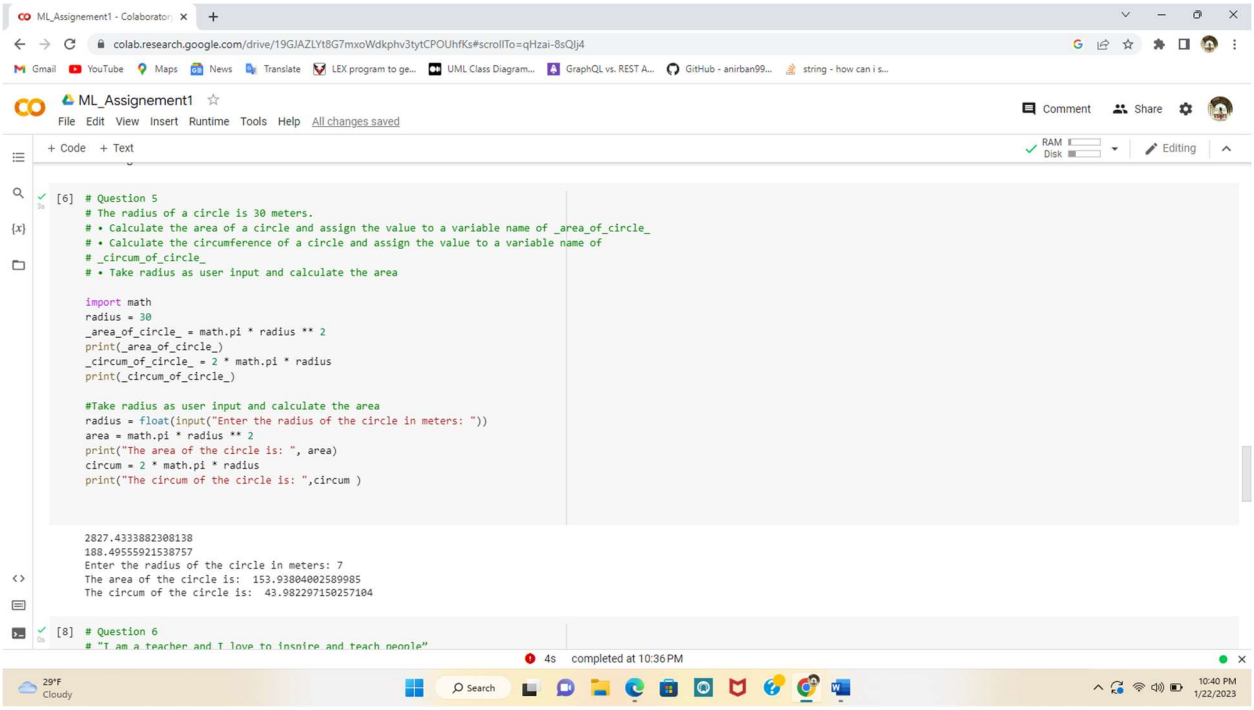
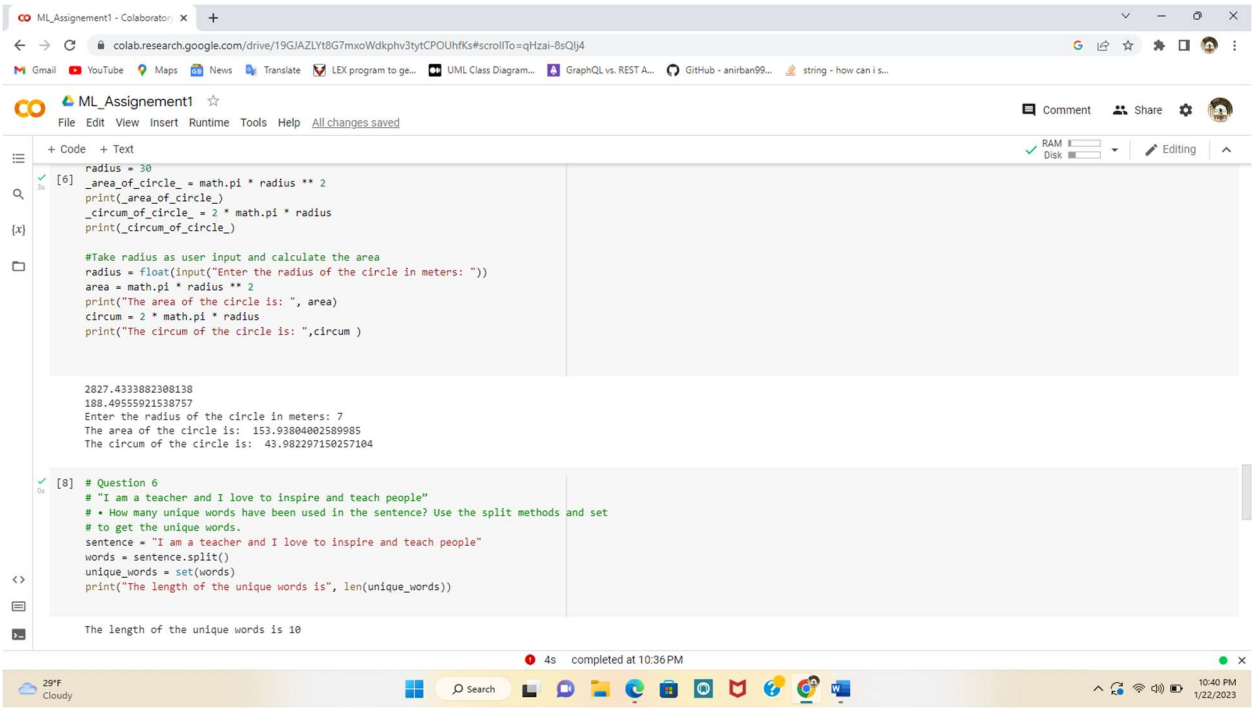
print("The circum of the circle is: ",circum )
```



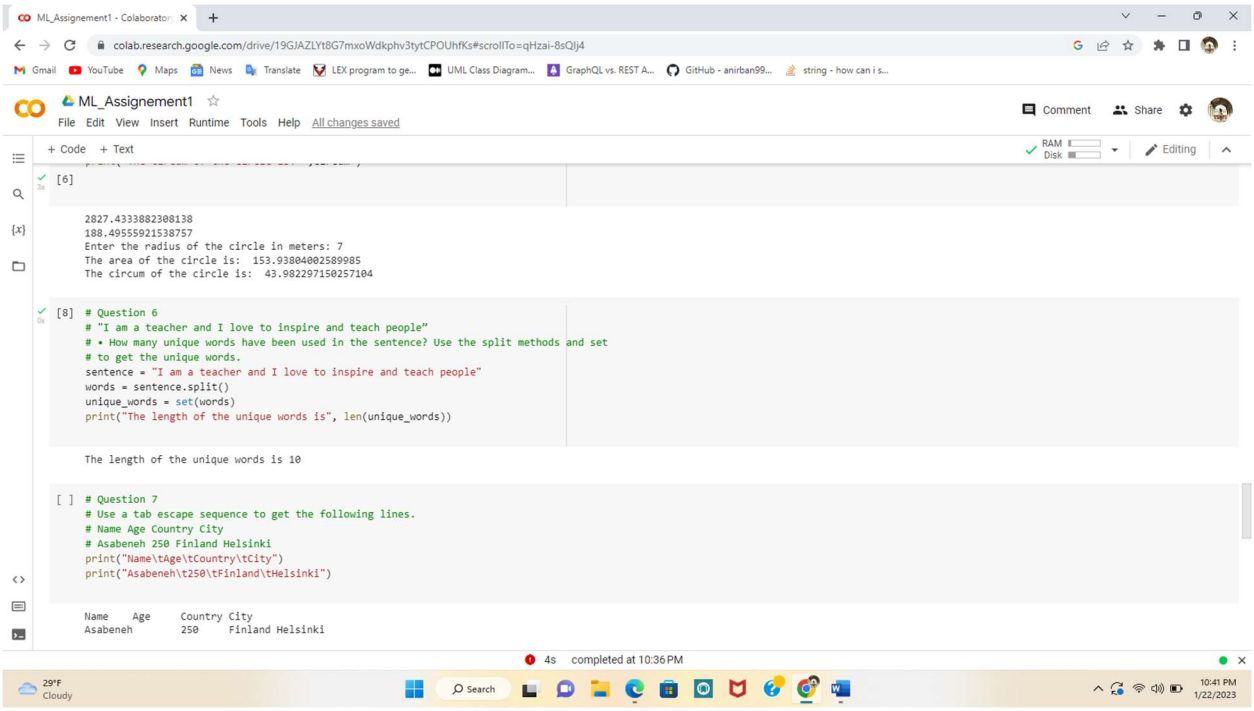
Here in the fifth question, found area and circumference using the formula by using the math module.

```
# Question 6
# "I am a teacher and I love to inspire and teach people”
# • How many unique words have been used in the sentence? Use the split me
thods and set
# to get the unique words.
sentence = "I am a teacher and I love to inspire and teach people"
words = sentence.split()
unique_words = set(words)
print("The length of the unique words is", len(unique_words))
```



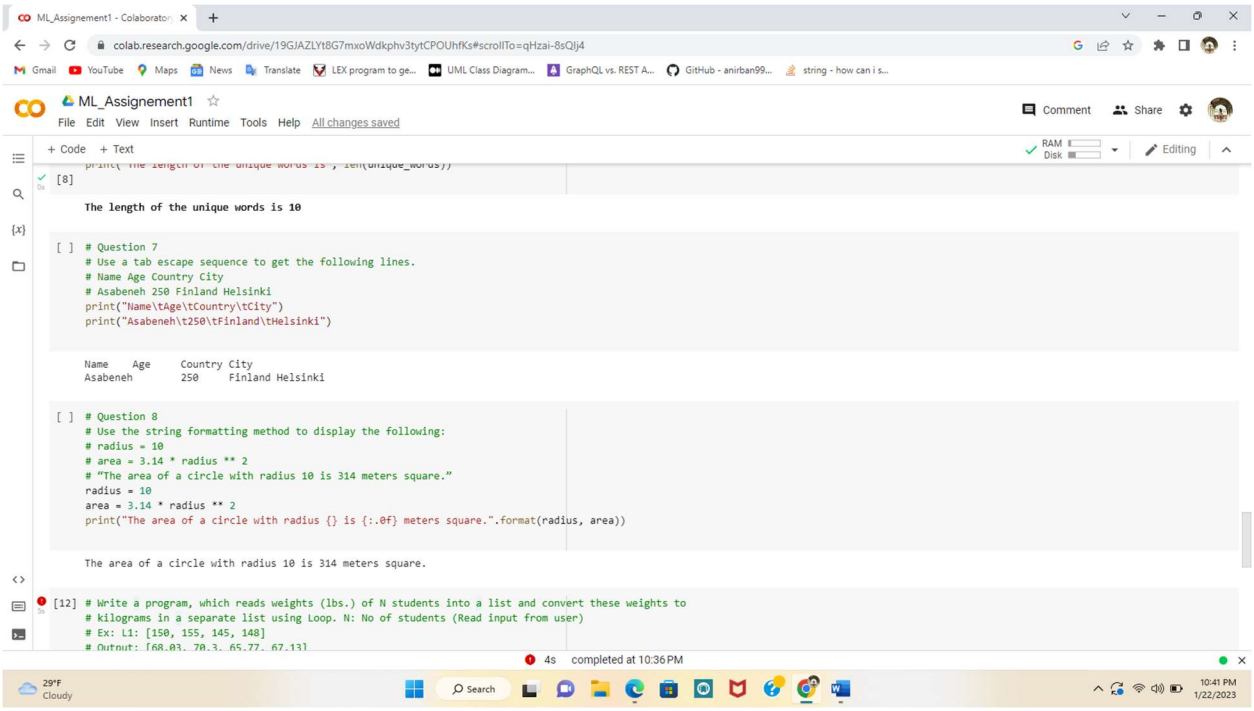
Here in the sixth question, found the unique words using split and set methods.

```
# Question 7
# Use a tab escape sequence to get the following lines.
# Name Age Country City
# Asabeneh 250 Finland Helsinki
print("Name\tAge\tCountry\tCity")
print("Asabeneh\t250\tFinland\tHelsinki")
```



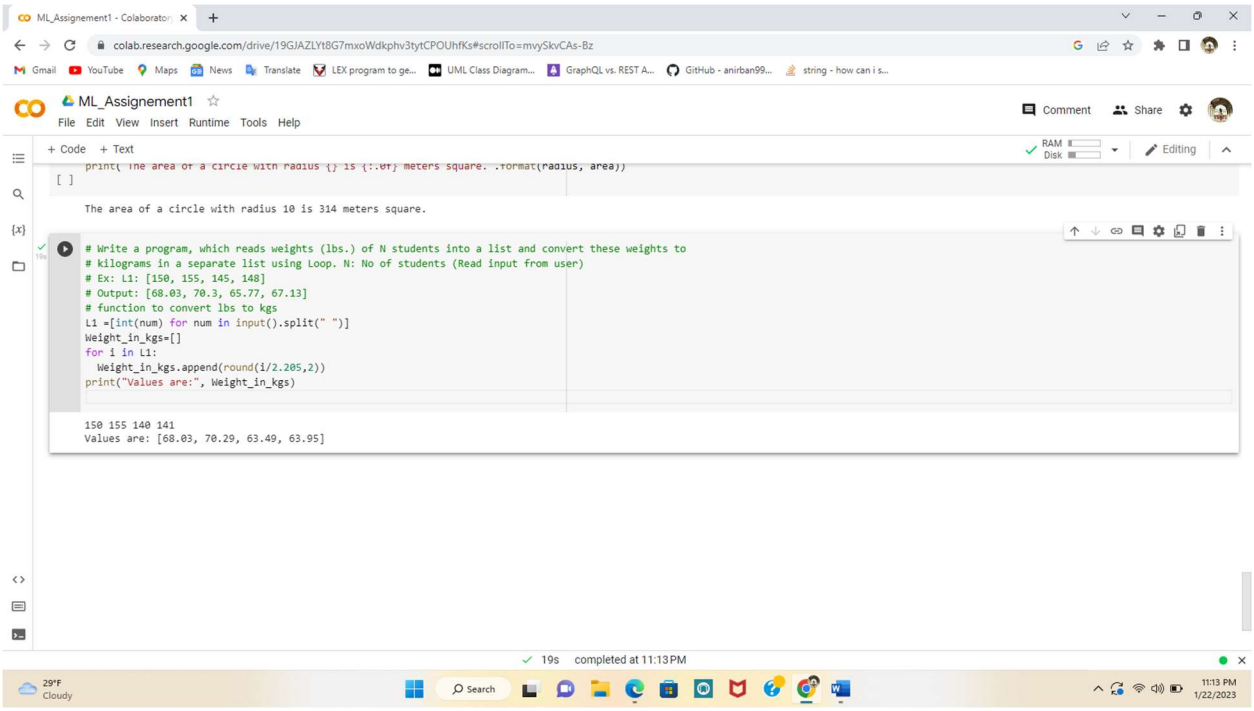
Here in the seventh question, getting the lines using the tab escape sequence

```
# Question 8
# Use the string formatting method to display the following:
# radius = 10
# area = 3.14 * radius ** 2
# “The area of a circle with radius 10 is 314 meters square.”
radius = 10
area = 3.14 * radius ** 2
print("The area of a circle with radius {} is {:.0f} meters square.".forma
t(radius, area))
```



Here in the eighth question, found the area of the circle and used the string formatting method to display it.

```
# Question 9
# Write a program, which reads weights (lbs.) of N students into a list an
d convert these weights to
# kilograms in a separate list using Loop. N: No of students (Read input f
rom user)
# Ex: L1: [150, 155, 145, 148]
# Output: [68.03, 70.3, 65.77, 67.13]
# function to convert lbs to kgs
L1 =[int(num) for num in input().split(" ")]
Weight_in_kgs=[]
for i in L1:
  Weight_in_kgs.append(round(i/2.205,2))
print("Values are:", Weight_in_kgs)
```



Here in the 9th question, converted the lbs in kgs from a list of n students in to a separate list.

Question 10

The diagram below shows a dataset with 2 classes and 8 data points, each with only one feature value, labeled f. Note that there are two data points with the same feature value of 6. These are shown as two x's one above the other. Provide stepwise mathematical solution, do not write code for it. 1. Divide this data equally into two parts. Use first part as training and second part as testing. Using KNN classifier, for K=3, what would be the predicted outputs for the test samples? Show how you arrived at your answer. 2. Compute the confusion matrix for this and calculate accuracy, sensitivity and specificity values

Test set

f	1	2	3	6	6	7	10	11
label	1	1	0	0	0	1	1	1

Train set

i) Using KNN classifier where K=3

$d = \sqrt{(x-x_1)^2}$

(x, x_1) (x, x_1) (x, x_1) (x, x_1)

(6,6) (6,3) (6,2) (6,1) are the points need to be calculated.

i.e

$d = \sqrt{(6-6)^2} = 0 = (6,6)$

$d = \sqrt{(6-3)^2} = \sqrt{9} = 3 = (6,3)$

$d = \sqrt{(6-2)^2} = \sqrt{(4)^2} = 4 \quad (6,2)$ } nearest

$d = \sqrt{(6-1)^2} = \sqrt{(5)^2} = 5 \quad (6,1)$

i.e (0, 0, 1)

max = 0 (o/p is also 0)

calculate for rest points which are also 0 (predicted)

ii) Confusion Matrix

Accuracy = (TP+TN) / (TN+FP+FN+TP)

Sensitivity = TP / (TP+FN)

Specificity = TN / (FP+TN)

	0	1
0	TN=1	FP=0
1	FN=3	TP=0

A = (0+1) / (1+0+3+0) = 1/4 = 25%

S = 0 / (0+3) = 0

Sp = 1 / (0+1) = 1

Repo: https://github.com/Goli18/Machine_Learning_Assignment01.git