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PART B

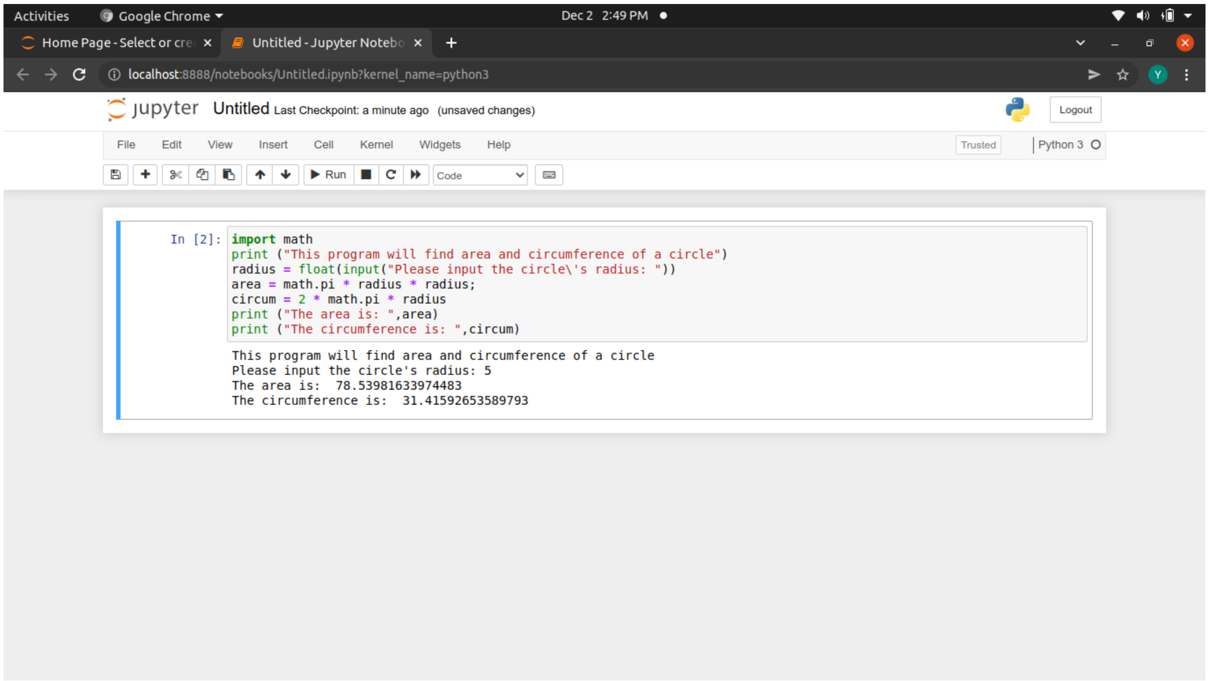
PART A

1. Basic Programs

Program to find area and circumference of a circle.

```
import math
print ("This program will find area and circumference of a circle")
radius = float(input("Please input the circle\'s radius: "))
area = math.pi * radius * radius;
circum = 2 * math.pi * radius
print ("The area is: ",area)
print ("The circumference is: ",circum)
```

Output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In [2]:

```
import math
print ("This program will find area and circumference of a circle")
radius = float(input("Please input the circle\'s radius: "))
area = math.pi * radius * radius;
circum = 2 * math.pi * radius
print ("The area is: ",area)
print ("The circumference is: ",circum)
```

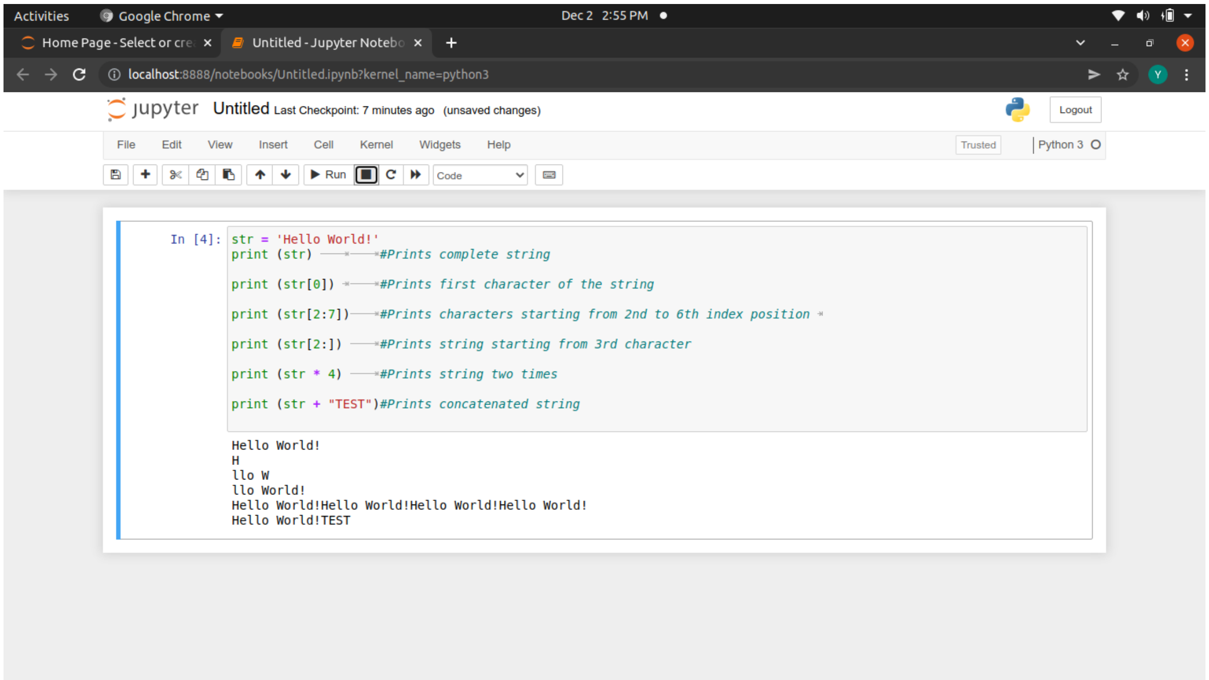
```
This program will find area and circumference of a circle
Please input the circle's radius: 5
The area is:  78.53981633974483
The circumference is:  31.41592653589793
```

2. String Programs

Program to demonstrate various ways of String manipulation.

```
str = 'Hello World!'
print (str)
print (str[0])
print (str[2:7])
print (str[2:])
print (str * 4)
print (str + "TEST")
```

Output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Code
In [4]:

```
str = 'Hello World!'
print (str)         #Prints complete string

print (str[0])      #Prints first character of the string

print (str[2:7])    #Prints characters starting from 2nd to 6th index position

print (str[2:])     #Prints string starting from 3rd character

print (str * 4)     #Prints string two times

print (str + "TEST")#Prints concatenated string
```

```
Hello World!
H
llo W
llo World!
Hello World!Hello World!Hello World!Hello World!
Hello World!TEST
```

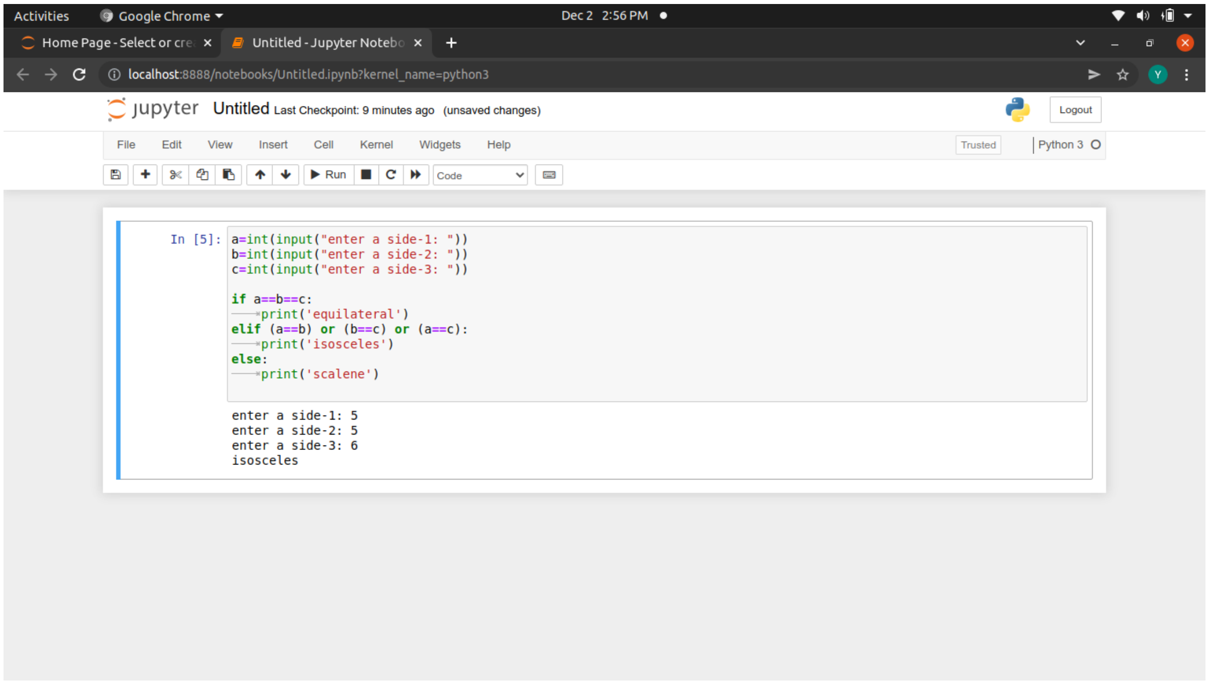
3. Control Structure Programs

Program to Find type of triangle as equilateral(all sides equal), isosceles (two sides the same), or scalene (all sides different).

```
a=int(input("enter a side-1: "))
b=int(input("enter a side-2: "))
c=int(input("enter a side-3: "))

if a==b==c:
        print('equilateral')
elif (a==b) or (b==c) or (a==c):
        print('isosceles')
else:
        print('scalene')
```

Output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```
In [5]: a=int(input("enter a side-1: "))
        b=int(input("enter a side-2: "))
        c=int(input("enter a side-3: "))

        if a==b==c:
            print('equilateral')
        elif (a==b) or (b==c) or (a==c):
            print('isosceles')
        else:
            print('scalene')
```

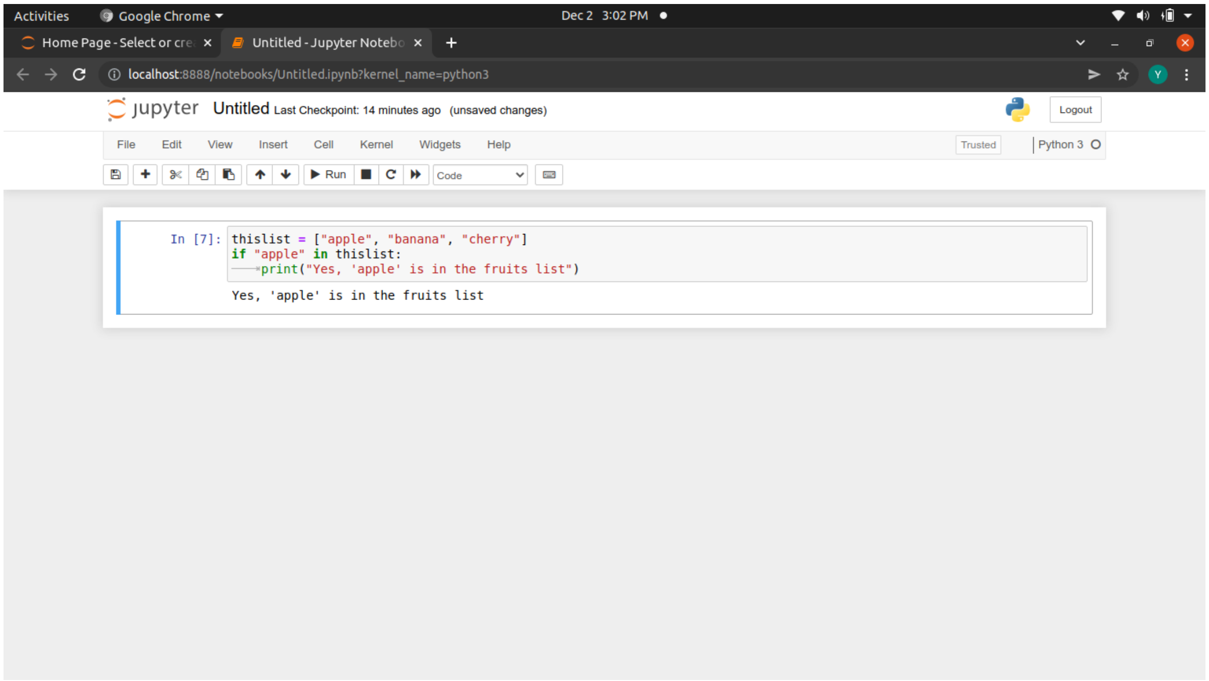
```
enter a side-1: 5
enter a side-2: 5
enter a side-3: 6
isosceles
```

4.List Programs

4.1 Program to find if item exists in list

```
thislist = ["apple", "banana", "cherry"]
if "apple" in thislist:
        print("Yes, 'apple' is in the fruits list")
```

Output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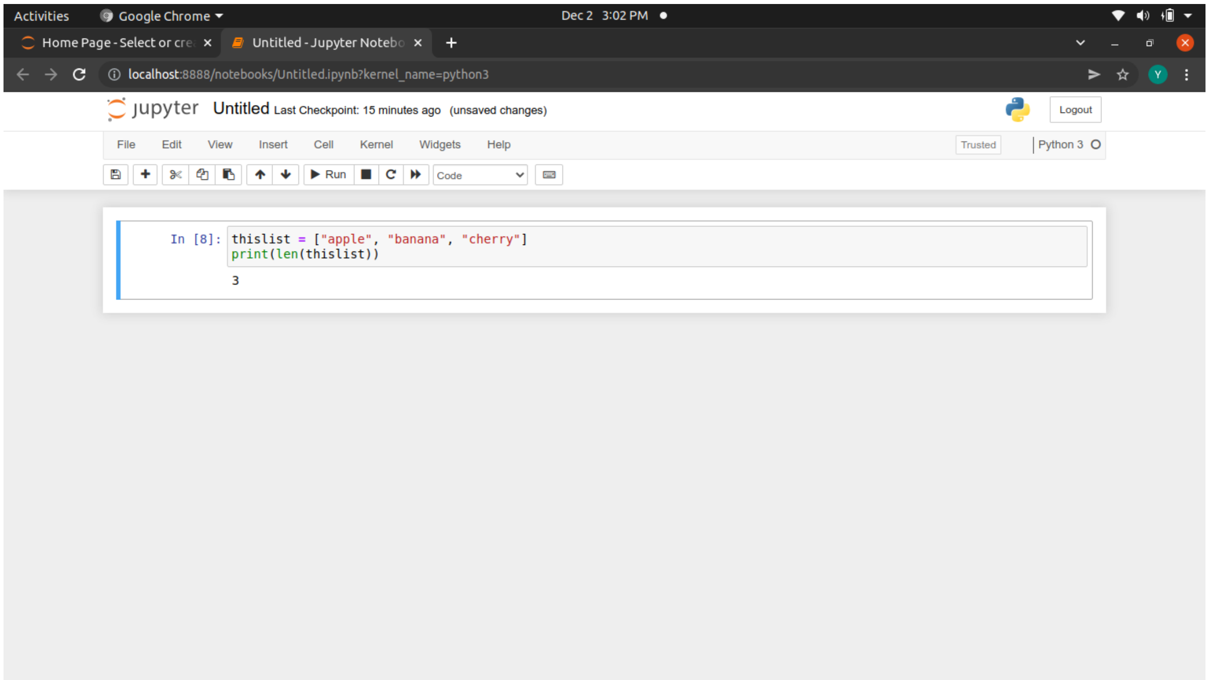
```
In [7]: thislist = ["apple", "banana", "cherry"]
        if "apple" in thislist:
            print("Yes, 'apple' is in the fruits list")

        Yes, 'apple' is in the fruits list
```

4.2 Program to Find Length of list

```
thislist = ["apple", "banana", "cherry"]
print(len(thislist))
```

Output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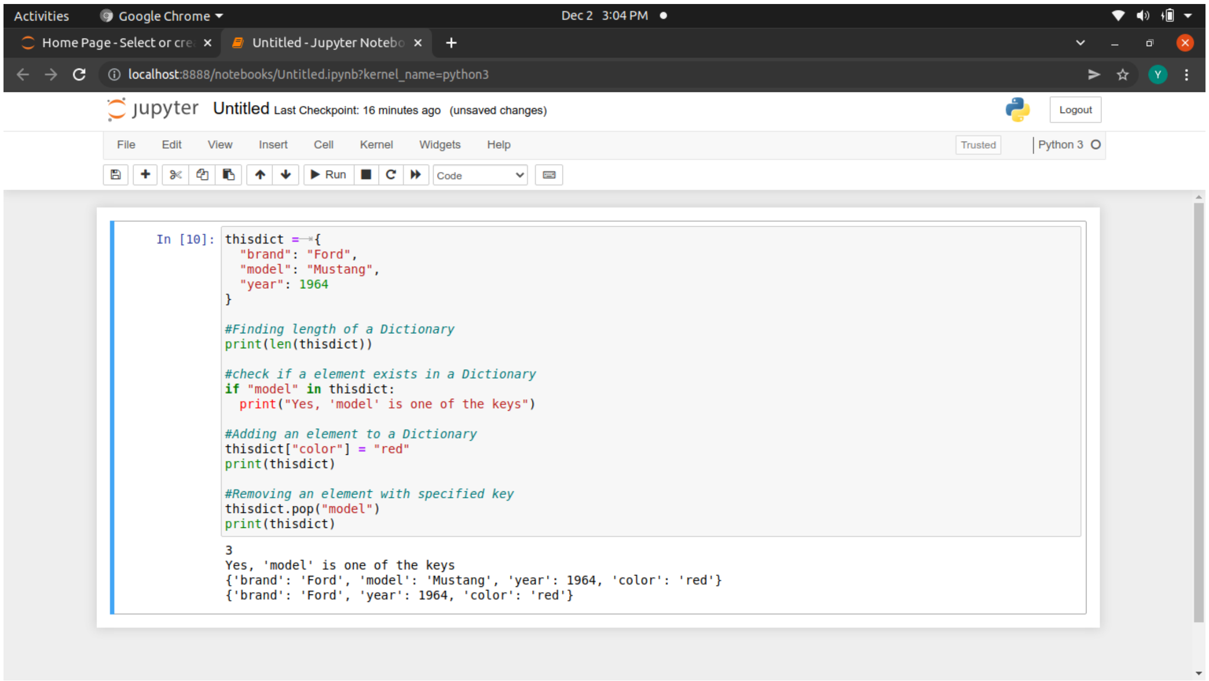
```
In [8]: thislist = ["apple", "banana", "cherry"]
        print(len(thislist))

        3
```

5. Dictionary Program

```
thisdict =   {
  "brand": "Ford",
  "model": "Mustang",
  "year": 1964
}

#Finding length of a Dictionary
print(len(thisdict))

#check if a element exists in a Dictionary
if "model" in thisdict:
  print("Yes, 'model' is one of the keys")

#Adding an element to a Dictionary
thisdict["color"] = "red"
print(thisdict)

#Removing an element with specified key
thisdict.pop("model")
print(thisdict)
```

Output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Python 3
Run
Code
In [10]:

```
thisdict = {
  "brand": "Ford",
  "model": "Mustang",
  "year": 1964
}

#Finding length of a Dictionary
print(len(thisdict))

#check if a element exists in a Dictionary
if "model" in thisdict:
  print("Yes, 'model' is one of the keys")

#Adding an element to a Dictionary
thisdict["color"] = "red"
print(thisdict)

#Removing an element with specified key
thisdict.pop("model")
print(thisdict)
```

```
3
Yes, 'model' is one of the keys
{'brand': 'Ford', 'model': 'Mustang', 'year': 1964, 'color': 'red'}
{'brand': 'Ford', 'year': 1964, 'color': 'red'}
```

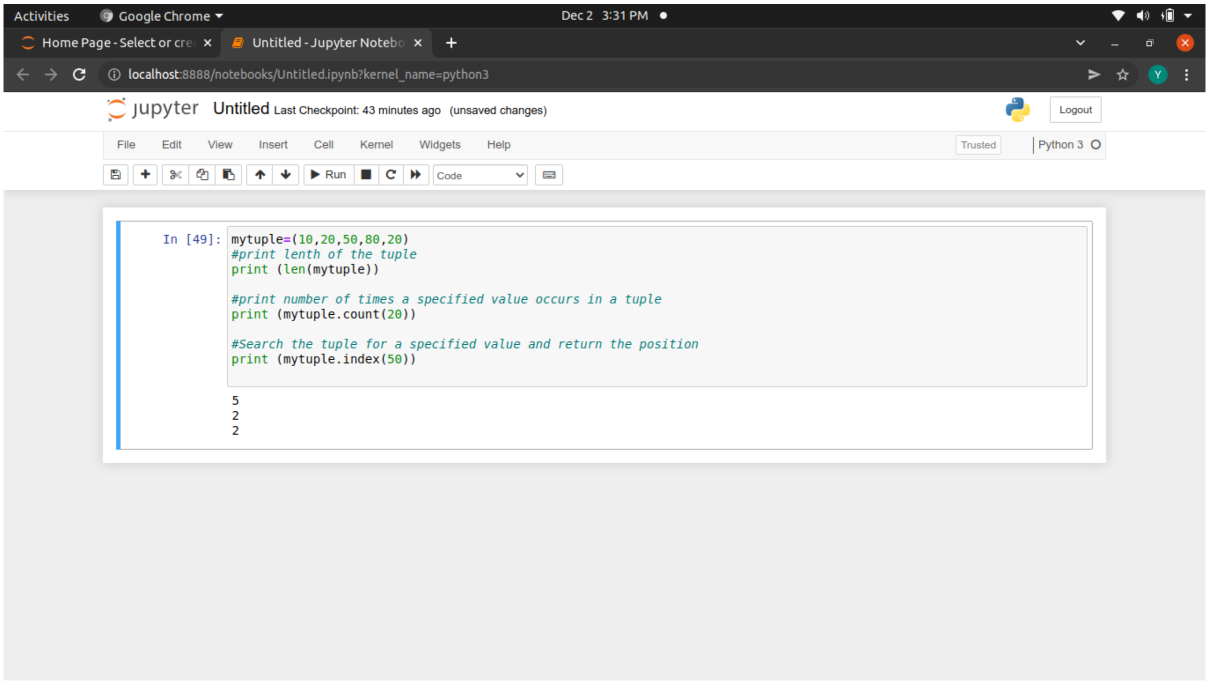
6. Tuple Programs

```
mytuple=(10,20,50,80,20)
print (len(mytuple))

#print number of times a specified value occurs in a tuple
print (mytuple.count(20))

#Search the tuple for a specified value and return the position
print (mytuple.index(50))
```

Output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Code

```
In [49]: mytuple=(10,20,50,80,20)
         #print lenth of the tuple
         print (len(mytuple))

         #print number of times a specified value occurs in a tuple
         print (mytuple.count(20))

         #Search the tuple for a specified value and return the position
         print (mytuple.index(50))

         5
         2
         2
```

7. Creating Functions

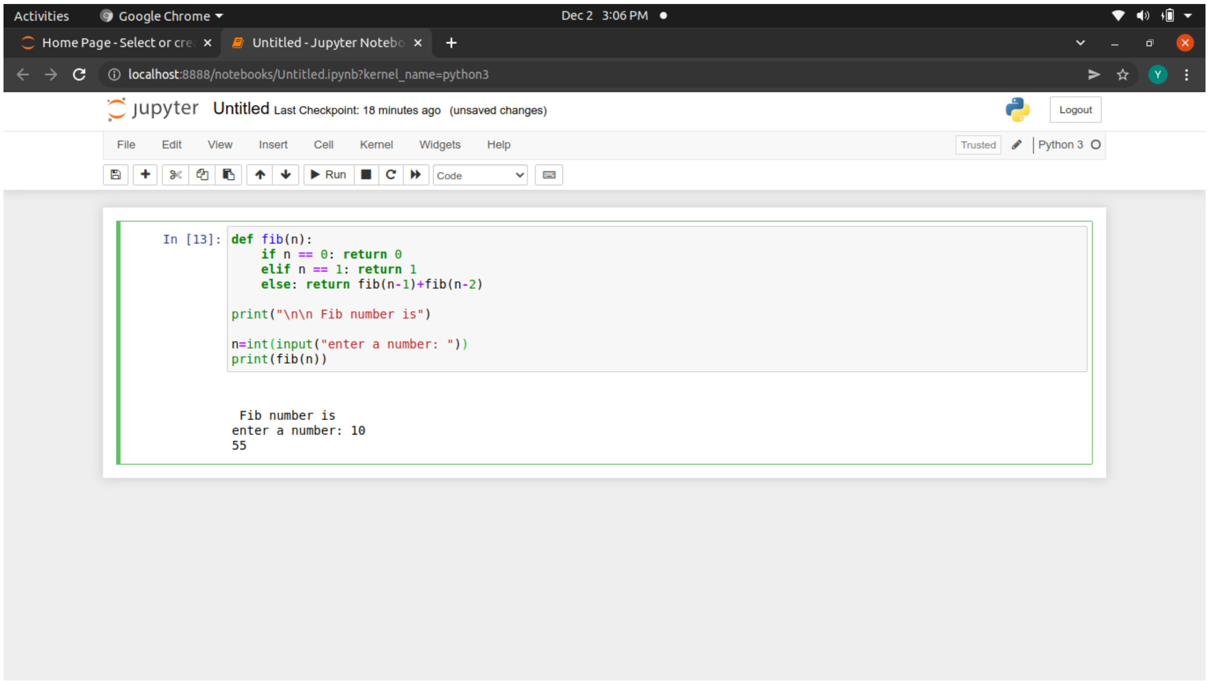
Program to generate nth Fib number:

```
def fib(n):
   if n == 0: return 0
   elif n == 1: return 1
   else: return fib(n-1)+fib(n-2)

print("\n\n Fib number is")

n=int(input("enter a number: "))
print(fib(n))
```

Output



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Code
In [13]:

```
def fib(n):
    if n == 0: return 0
    elif n == 1: return 1
    else: return fib(n-1)+fib(n-2)

print("\n\n Fib number is")

n=int(input("enter a number: "))
print(fib(n))
```

```


 Fib number is
enter a number: 10
55
```

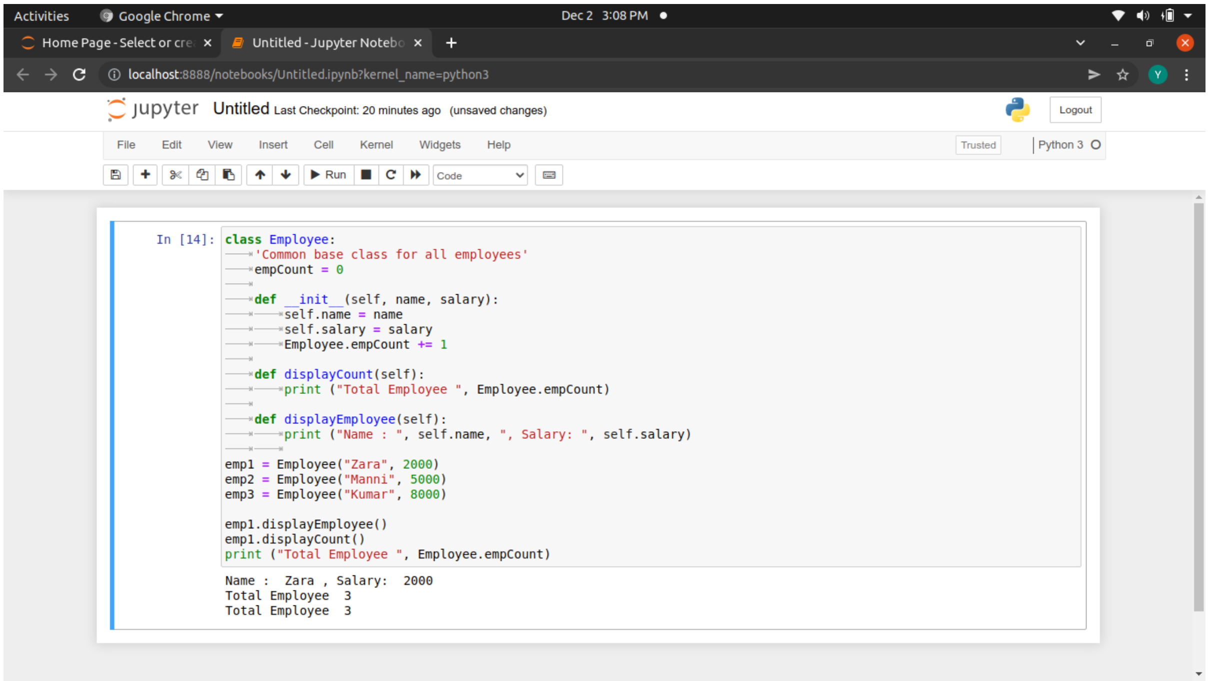
8. Object Oriented Programming

Program to create Employee class and instantiating an object upon it

```
class Employee:

    empCount = 0

    def __init__(self, name, salary):
        self.name = name
        self.salary = salary
        Employee.empCount += 1

    def displayCount(self):
        print ("Total Employee ", Employee.empCount)

    def displayEmployee(self):
        print ("Name : ", self.name, ", Salary: ", self.salary)

emp1 = Employee("Zara", 2000)
emp2 = Employee("Manni", 5000)
emp3 = Employee("Kumar", 8000)

emp1.displayEmployee()
emp1.displayCount()
```

print ("Total Employee ", Employee.empCount)

Output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Python 3
Run
Code
In [14]:

```
class Employee:
    'Common base class for all employees'
    empCount = 0

    def __init__(self, name, salary):
        self.name = name
        self.salary = salary
        Employee.empCount += 1

    def displayCount(self):
        print ("Total Employee ", Employee.empCount)

    def displayEmployee(self):
        print ("Name : ", self.name, ", Salary: ", self.salary)

emp1 = Employee("Zara", 2000)
emp2 = Employee("Manni", 5000)
emp3 = Employee("Kumar", 8000)

emp1.displayEmployee()
emp1.displayCount()
print ("Total Employee ", Employee.empCount)
```

```
Name :  Zara , Salary:  2000
Total Employee  3
Total Employee  3
```

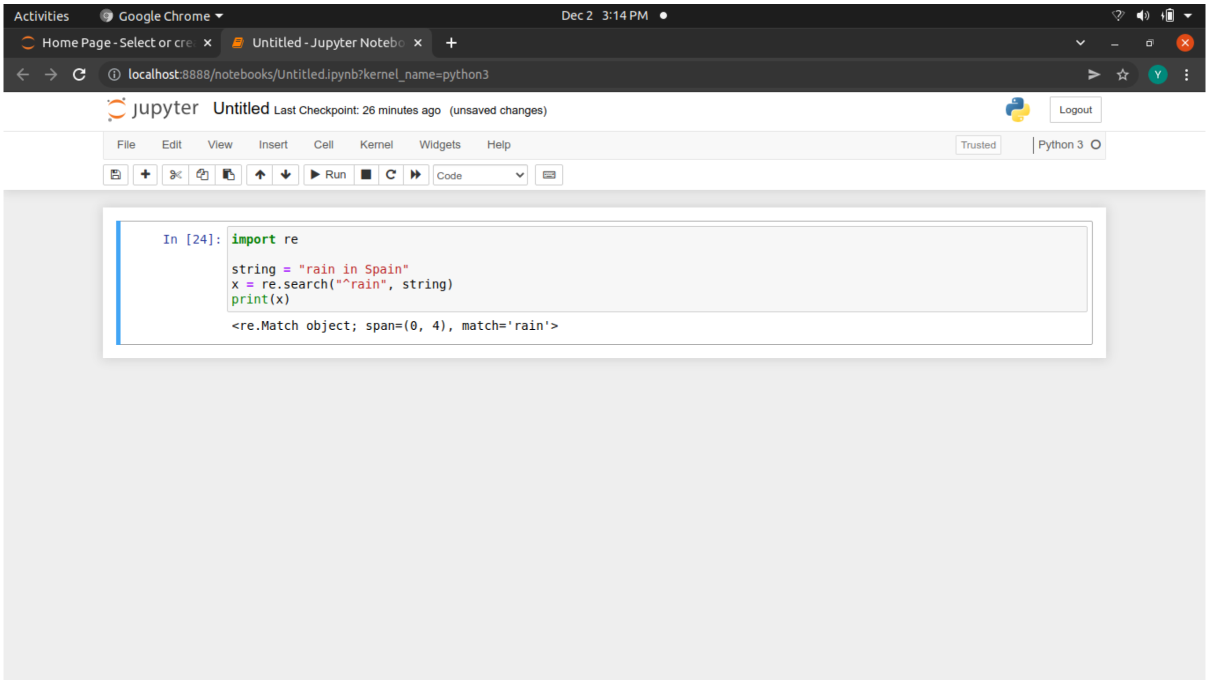
9. Pattern Matching

9.1 Program to match a word at the beginning of a given string

```
import re

string = "rain in Spain"
x = re.search("^rain", string)
print(x)
```

Output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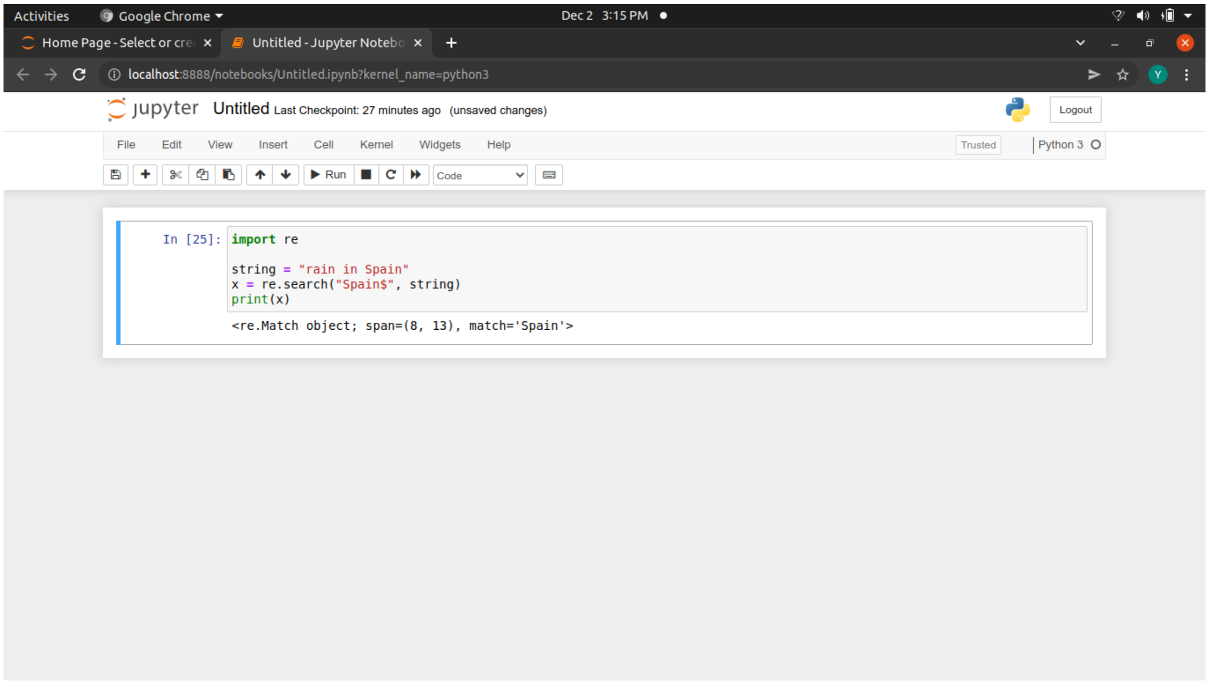
Trusted
Python 3
Run
Code

```
In [24]: import re

         string = "rain in Spain"
         x = re.search("^rain", string)
         print(x)

         <re.Match object; span=(0, 4), match='rain'>
```

9.2 Program to match a word at the end of a given string:

```
import re

string = "rain in Spain"
x = re.search("Spain$", string)
print(x)
```

Output



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Code

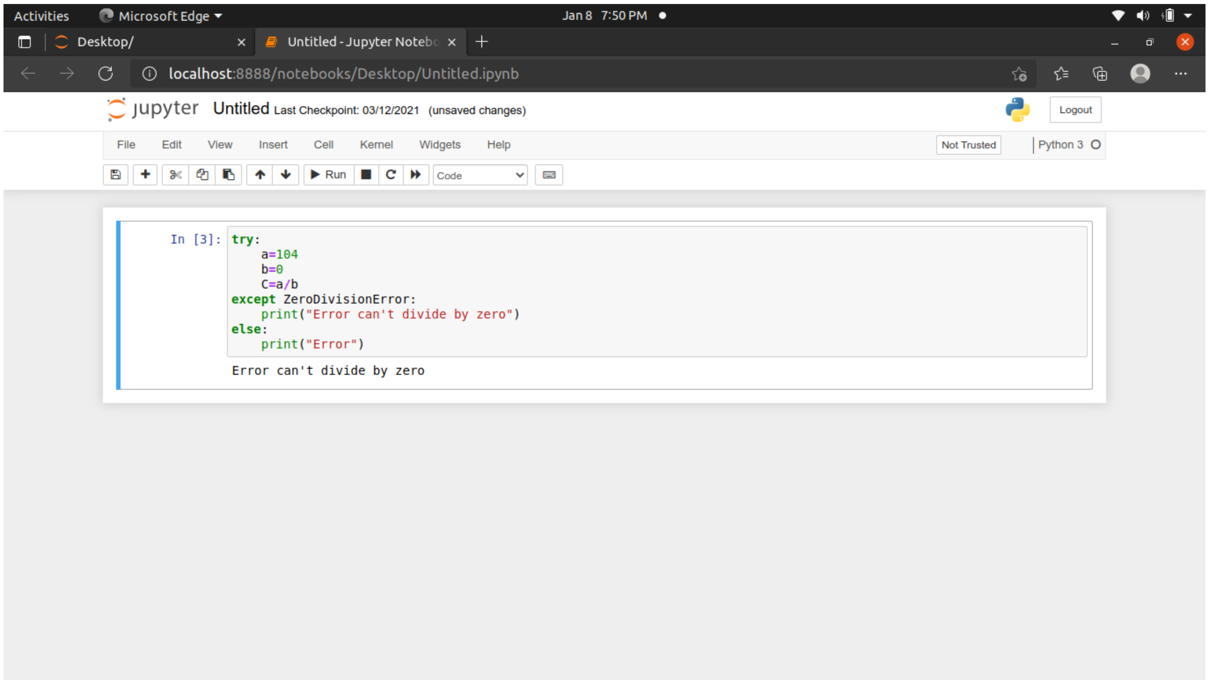
```
In [25]: import re

         string = "rain in Spain"
         x = re.search("Spain$", string)
         print(x)

         <re.Match object; span=(8, 13), match='Spain'>
```

10. Handling Exceptions

Program to handle Zero Division Error

```
try:
        a=104
    b=0
    C=a/b
except ZeroDivisionError:
        print ("Error: can\'t divide by zero")
else:
        print ("Error")
```

Output



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Python 3
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Code

```
In [3]: try:
            a=104
            b=0
            C=a/b
        except ZeroDivisionError:
            print("Error can't divide by zero")
        else:
            print("Error")

        Error can't divide by zero
```

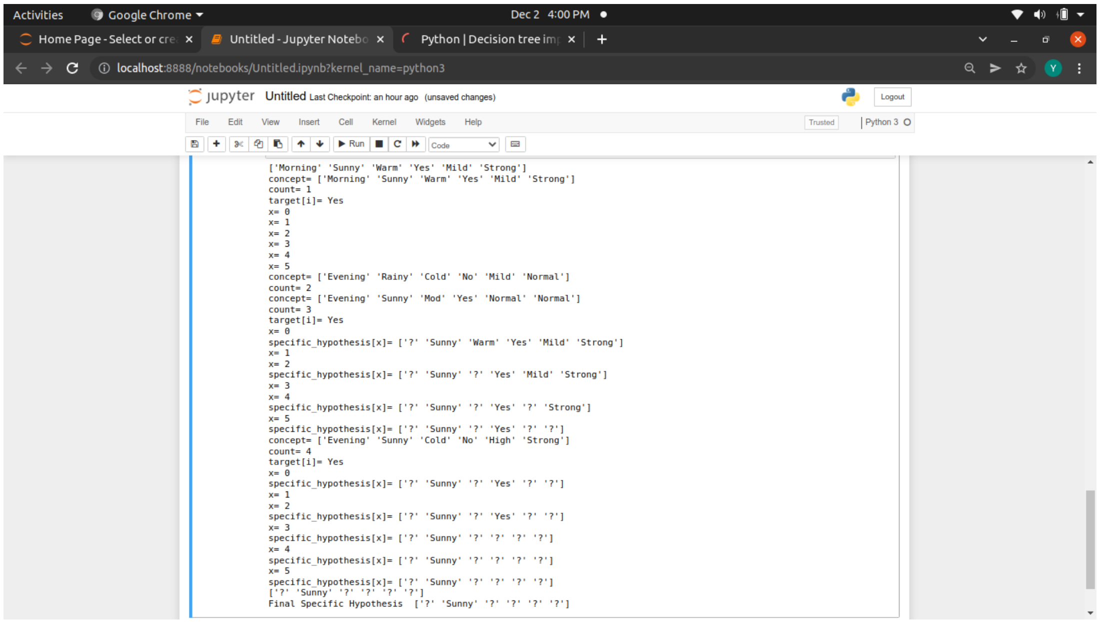
PART B

11. Program to implement and demonstrate Find-S algorithm.

```
import pandas as pd

import numpy as np



data = pd.read_csv("C:/Users/Admin/Desktop/find_S.csv")

concepts = np.array(dat6a)[:,:-1]

target = np.array(data)[:,-1]

def train(con, tar):

    for i, val in enumerate(tar):

        if val == 'yes':

            specific_h = con[i].copy()

            break



    for i, val in enumerate(con):

        if tar[i] == 'yes':

            for x in range(len(specific_h)):

                if val[x] != specific_h[x]:
```

```
                specific_h[x] = '?'
            else:
                pass
    return specific_h
print(train(concepts, target))
```

Output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```
['Morning' 'Sunny' 'Warm' 'Yes' 'Mild' 'Strong']
concept= ['Morning' 'Sunny' 'Warm' 'Yes' 'Mild' 'Strong']
count= 1
target[i]= Yes
x= 0
x= 1
x= 2
x= 3
x= 4
x= 5
concept= ['Evening' 'Rainy' 'Cold' 'No' 'Mild' 'Normal']
count= 2
concept= ['Evening' 'Sunny' 'Mod' 'Yes' 'Normal' 'Normal']
count= 3
target[i]= Yes
x= 0
specific_hypothesis[x]= ['?' 'Sunny' 'Warm' 'Yes' 'Mild' 'Strong']
x= 1
x= 2
specific_hypothesis[x]= ['?' 'Sunny' '?' 'Yes' 'Mild' 'Strong']
x= 3
x= 4
specific_hypothesis[x]= ['?' 'Sunny' '?' 'Yes' '?' 'Strong']
x= 5
specific_hypothesis[x]= ['?' 'Sunny' '?' 'Yes' '?' '?']
concept= ['Evening' 'Sunny' 'Cold' 'No' 'High' 'Strong']
count= 4
target[i]= Yes
x= 0
specific_hypothesis[x]= ['?' 'Sunny' '?' 'Yes' '?' '?']
x= 1
x= 2
specific_hypothesis[x]= ['?' 'Sunny' '?' 'Yes' '?' '?']
x= 3
specific_hypothesis[x]= ['?' 'Sunny' '?' '?' '?' '?']
x= 4
specific_hypothesis[x]= ['?' 'Sunny' '?' '?' '?' '?']
x= 5
specific_hypothesis[x]= ['?' 'Sunny' '?' '?' '?' '?']
['?' 'Sunny' '?' '?' '?' '?']
Final Specific Hypothesis  ['?' 'Sunny' '?' '?' '?' '?']
```

12. Write a program to implement the naive Bayesian Classifier

```
import pandas as pd

from sklearn.model_selection import train_test_split

from sklearn.naive_bayes import GaussianNB


titanic= pd.read_csv("titanic.csv")

titanic.drop(['PassengerId','Name','SibSp','Parch','Ticket','Cabin','Embarked',],
axis='columns',inplace=True)

titanic.head()

target= titanic.Survived

inputs= titanic.drop('Survived',axis='columns')

inputs.head()

dummies=pd.get_dummies(inputs.Sex)

dummies.head()

inputs=pd.concat([inputs,dummies],axis='columns')

inputs.head()

inputs.drop('Sex',axis='columns',inplace=True)

inputs.head()

inputs.columns[inputs.isna().any()]
```

inputs.Age[:10]

inputs.Age=inputs.Age.fillna(inputs.Age.mean())

inputs.head(6)

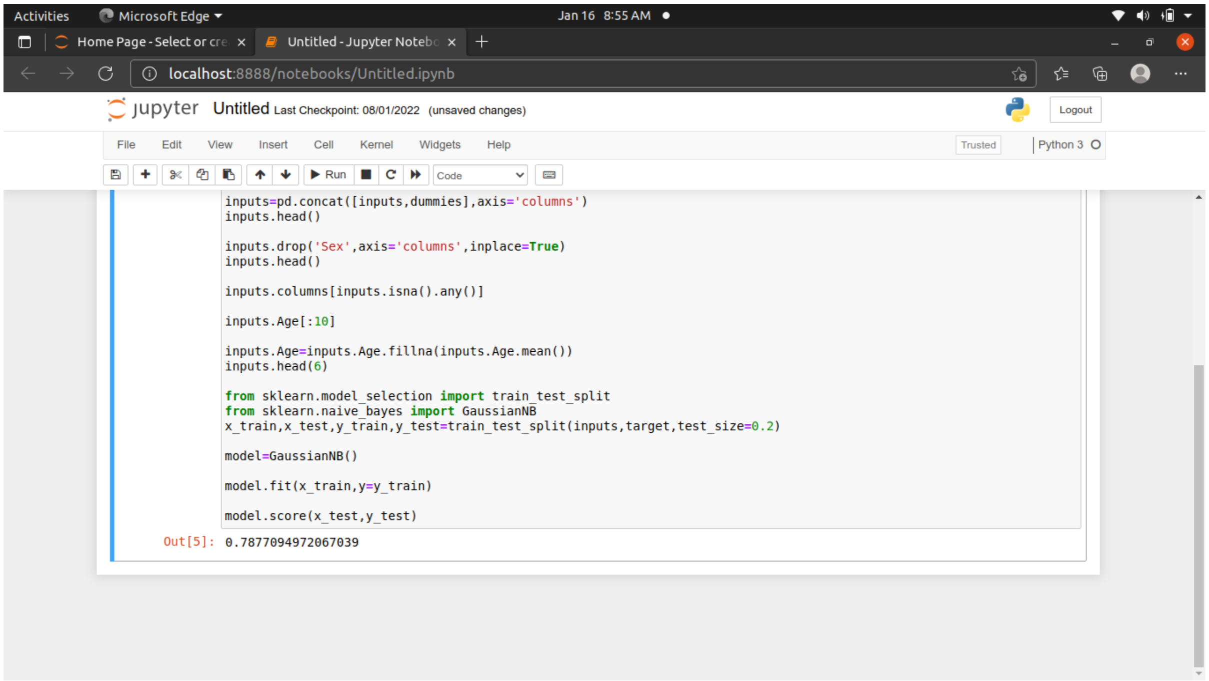
x_train,x_test,y_train,y_test=train_test_split(inputs,target,test_size=0.2)

model=GaussianNB()

model.fit(x_train,y=y_train)

model.score(x_test,y_test)

Output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```
inputs=pd.concat([inputs,dummies],axis='columns')
inputs.head()

inputs.drop('Sex',axis='columns',inplace=True)
inputs.head()

inputs.columns[inputs.isna().any()]

inputs.Age[:10]

inputs.Age=inputs.Age.fillna(inputs.Age.mean())
inputs.head(6)

from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import GaussianNB
x_train,x_test,y_train,y_test=train_test_split(inputs,target,test_size=0.2)

model=GaussianNB()

model.fit(x_train,y=y_train)

model.score(x_test,y_test)
```

```
Out[5]: 0.7877094972067039
```

13. Write a program for K-Means clustering

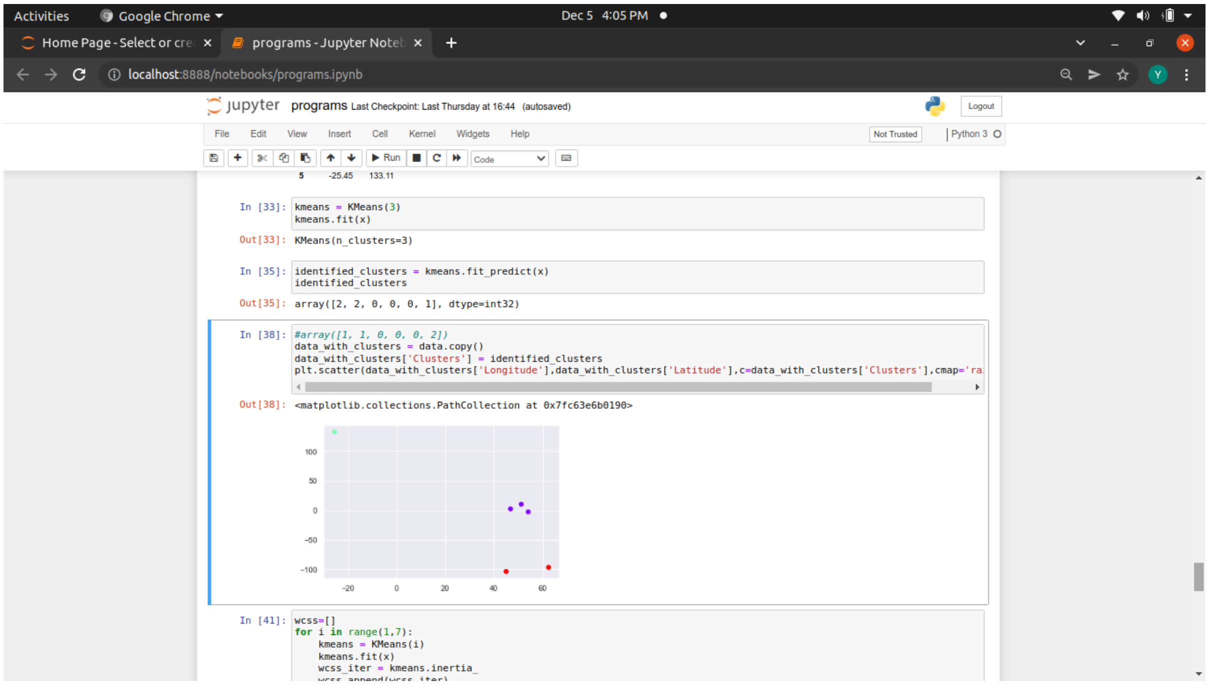
```
import numpy as np
import pandas as pd
import statsmodels.api as sm
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.cluster import KMeans

completeData = pd.read_csv('world_country_and_usa_states_latitude_and_longitude_values.csv')
data=completeData.head(10)
plt.scatter(data['longitude'],data['latitude'])
plt.show()
x = data.iloc[:,1:3]                    # 1st is for rows and 2nd is for columns
kmeans = KMeans(5)
kmeans.fit(x)
identified_clusters = kmeans.fit_predict(x)
identified_clusters
```

data_with_clusters = data.copy()

data_with_clusters['Clusters'] = identified_clusters

plt.scatter(data_with_clusters['longitude'],data_with_clusters['latitude'],c=data_with_clusters['Clusters'],cmap='rainbow')

Output



```
    5    -25.45    133.11

In [33]: kmeans = KMeans(3)
         kmeans.fit(x)

Out[33]: KMeans(n_clusters=3)

In [35]: identified_clusters = kmeans.fit_predict(x)
         identified_clusters

Out[35]: array([2, 2, 0, 0, 0, 1], dtype=int32)

In [38]: #array([1, 1, 0, 0, 0, 2])
         data_with_clusters = data.copy()
         data_with_clusters['Clusters'] = identified_clusters
         plt.scatter(data_with_clusters['Longitude'],data_with_clusters['Latitude'],c=data_with_clusters['Clusters'],cmap='ra

Out[38]: <matplotlib.collections.PathCollection at 0x7fc63e6b0190>

In [41]: wcss=[]
         for i in range(1,7):
             kmeans = KMeans(i)
             kmeans.fit(x)
             wcss_iter = kmeans.inertia_
             wcss.append(wcss_iter)
```

14. Write a program for K-Nearest Neighbour algorithm

```
# Import necessary modules

from sklearn.neighbors import KNeighborsClassifier

from sklearn.model_selection import train_test_split

from sklearn.datasets import load_iris


# Loading data

irisData = load_iris()

# Create feature and target arrays

X = irisData.data

y = irisData.target


# Split into training and test set

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.2,
random_state=1)

knn = KNeighborsClassifier(n_neighbors=7)

knn.fit(X_train, y_train)

# Predict on dataset which model has not seen before

print(knn.predict(X_test))
```

```
# Calculate the accuracy of the model

print("The Accuracy is:", knn.score(X_test, y_test))
```

Output

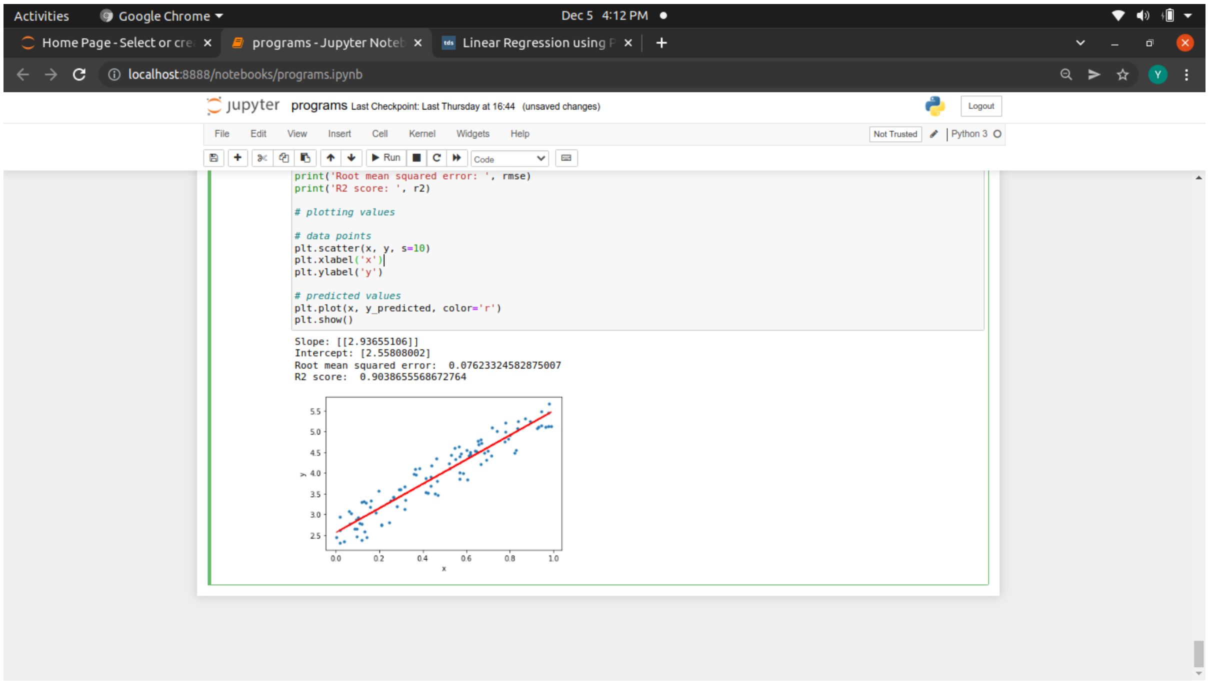
```
The Accuracy is: 0.9666666666666667
```

15. Implement the regression algorithm in order to fit data points

```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score


# generate random data-set
np.random.seed(0)
x = np.random.rand(100, 1)
y = 2 + 3 * x + np.random.rand(100, 1)


# Model initialization
regression_model = LinearRegression()
# Fit the data(train the model)
regression_model.fit(x, y)
# Predict
y_predicted = regression_model.predict(x)
# model evaluation
```

```
rmse = mean_squared_error(y, y_predicted)

r2 = r2_score(y, y_predicted)

# Printing values

print('Slope:' ,regression_model.coef_)

print('Intercept:', regression_model.intercept_)

print('Root mean squared error: ', rmse)

print('R2 score: ', r2)

# data points

plt.scatter(x, y, s=10)

plt.xlabel('x')

plt.ylabel('y')

# predicted values

plt.plot(x, y_predicted, color='r')

plt.show()
```

Output


Activities
Google Chrome
Dec 5 4:12 PM
Home Page - Select or cre
programs - Jupyter Noteb
Linear Regression using P
localhost:8888/notebooks/programs.ipynb
jupyter programs Last Checkpoint: Last Thursday at 16:44 (unsaved changes)
Logout
File Edit View Insert Cell Kernel Widgets Help
Not Trusted
Python 3
Run
Code
5.5
5.0
4.5
4.0
3.5
3.0
2.5
y
0.0
0.2
0.4
0.6
0.8
1.0
x

```
print('Root mean squared error: ', rmse)
print('R2 score: ', r2)

# plotting values

# data points
plt.scatter(x, y, s=10)
plt.xlabel('x')
plt.ylabel('y')

# predicted values
plt.plot(x, y_predicted, color='r')
plt.show()
```

```
Slope: [[2.93655106]]
Intercept: [2.55808002]
Root mean squared error:  0.07623324582875007
R2 score:  0.9038655568672764
```