CO1:

2. Display future leap years from current year to a final year entered by user.

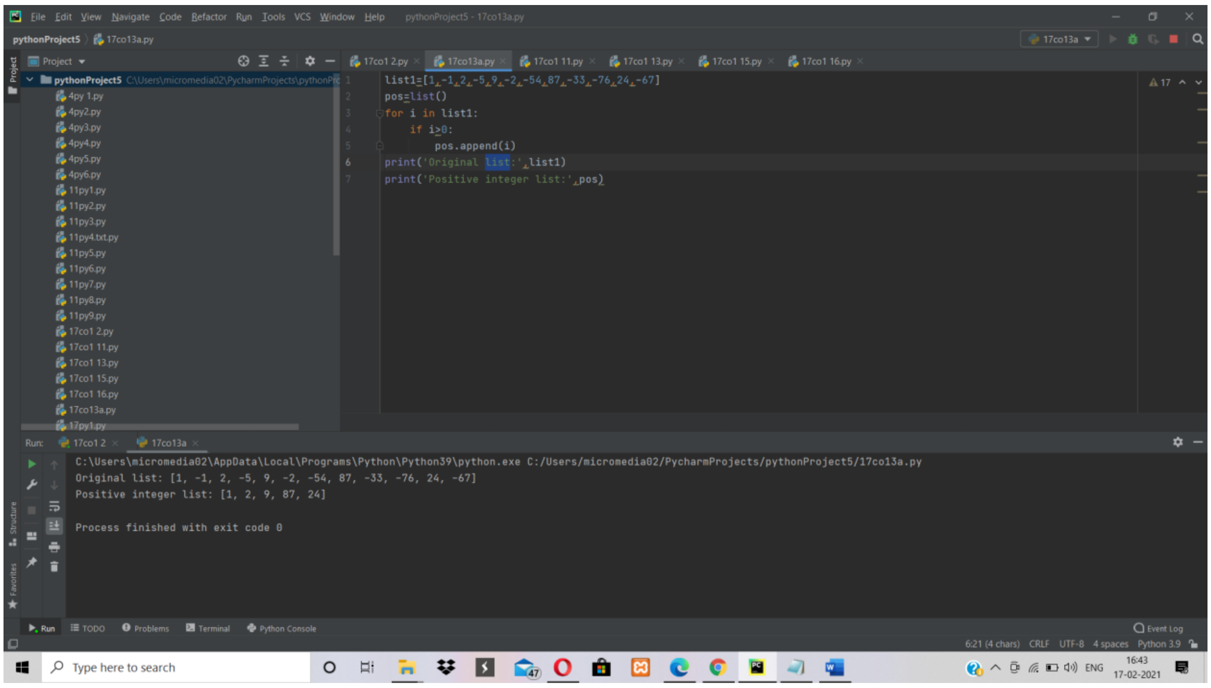
```
import datetime

a=datetime.datetime.now()

a=int(a.year)

b=int(input("Enter final year: "))

print("\nLeap Years:")

for i in range(a,b+1):

 if(i%4==0):

  print(i)
```

output

```
enter final year:2021

leap year:2020
```

3. List comprehensions: (a) Generate positive list of numbers from a given list of integers

```
list1=[1,-1,2,-5,9,-2,-54,87,-33,-76,24,-67]

pos=list()

for i in list1:

    if i>0:

        pos.append(i)

print('Original list:',list1)

print('Positive integer list:',pos)
```

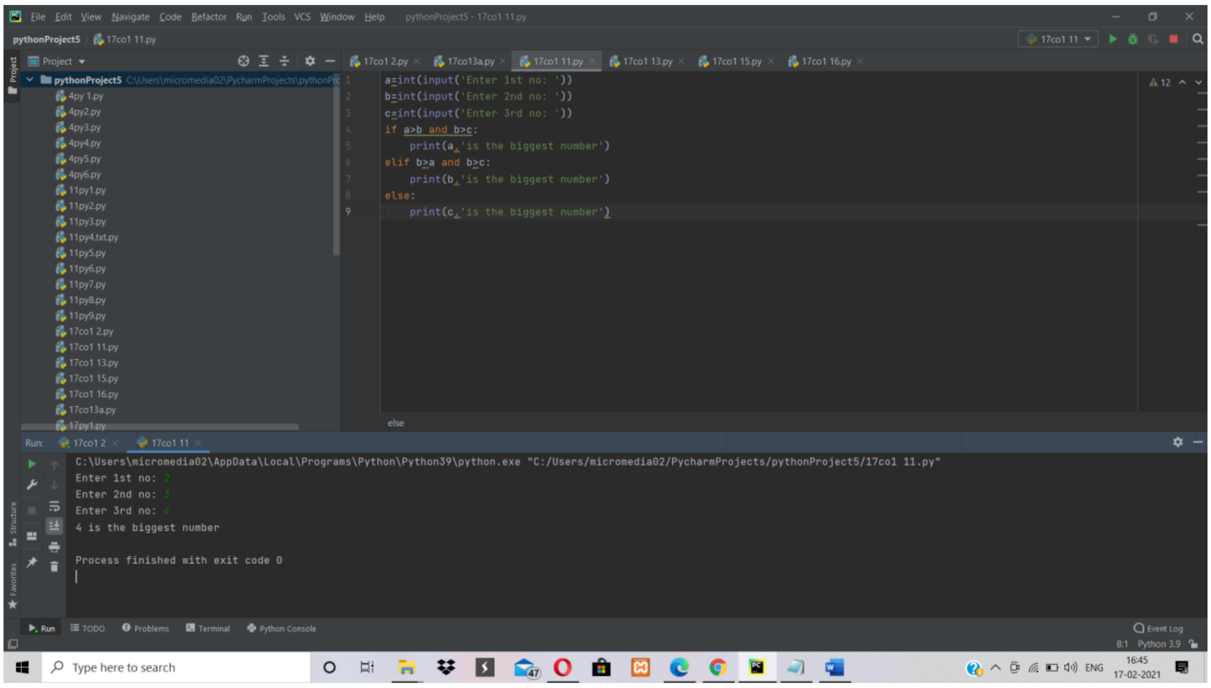


```
list1=[1,-1,2,-5,9,-2,-54,87,-33,-76,24,-67]
pos=list()
for i in list1:
    if i>0:
        pos.append(i)
print('Original list:',list1)
print('Positive integer list:',pos)
```

```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe C:/Users/micromedia02/PycharmProjects/pythonProject5/17co13a.py
Original list: [1, -1, 2, -5, 9, -2, -54, 87, -33, -76, 24, -67]
Positive integer list: [1, 2, 9, 87, 24]

Process finished with exit code 0
```

11. Find biggest of 3 numbers entered.

```
a=int(input('Enter 1st no: '))
b=int(input('Enter 2nd no: '))
c=int(input('Enter 3rd no: '))
if a>b and b>c:
    print(a,'is the biggest number')
elif b>a and b>c:
    print(b,'is the biggest number')
else:
    print(c,'is the biggest number')
```



```
a=int(input('Enter 1st no: '))
b=int(input('Enter 2nd no: '))
c=int(input('Enter 3rd no: '))
if a>b and b>c:
    print(a,'is the biggest number')
elif b>a and b>c:
    print(b,'is the biggest number')
else:
    print(c,'is the biggest number')
```

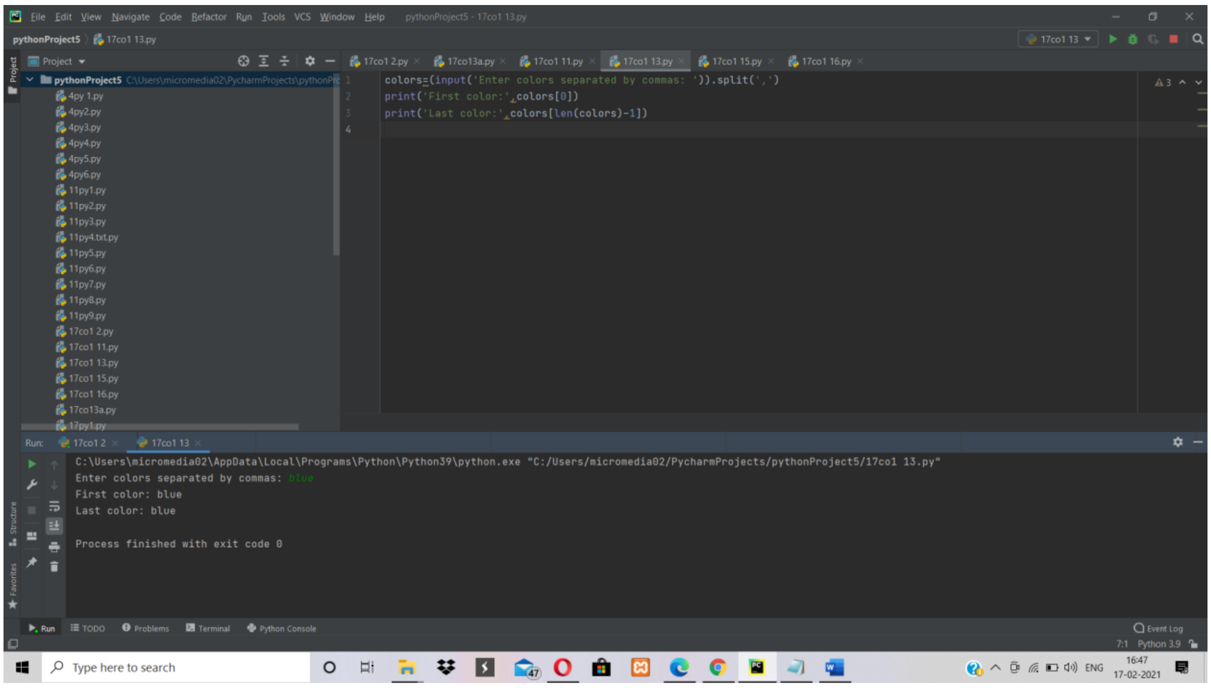
```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe "C:/Users/micromedia02/PycharmProjects/pythonProject5/17co1 11.py"
Enter 1st no: 2
Enter 2nd no: 3
Enter 3rd no: 4
4 is the biggest number

Process finished with exit code 0
```

13. Create a list of colors from comma-separated color names entered by user. Display first and last colors.

colors=(input('Enter colors separated by commas: ')).split(',')

print('First color:',colors[0])

print('Last color:',colors[len(colors)-1])



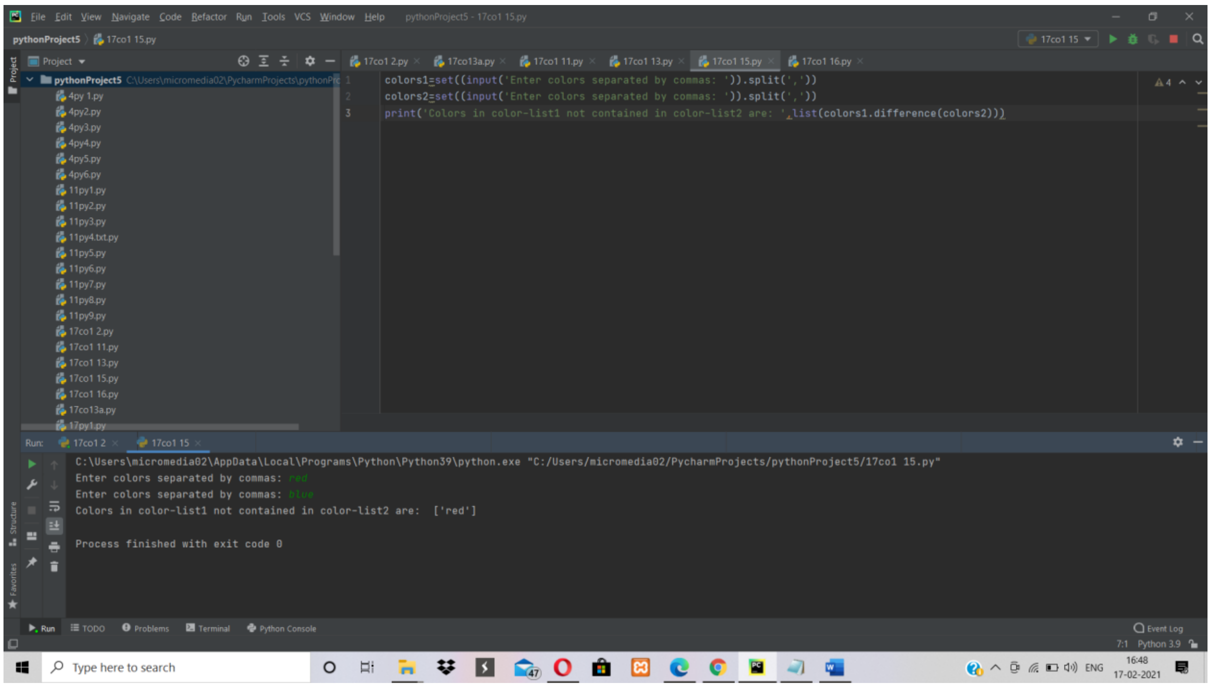
```
colors=(input('Enter colors separated by commas: ')).split(',')
print('First color:',colors[0])
print('Last color:',colors[len(colors)-1])
```

```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe "C:/Users/micromedia02/PycharmProjects/pythonProject5/17co1 13.py"
Enter colors separated by commas: blue
First color: blue
Last color: blue

Process finished with exit code 0
```

15. Print out all colors from color-list1 not contained in color-list2.

colors1=set((input('Enter colors separated by commas: ')).split(','))

colors2=set((input('Enter colors separated by commas: ')).split(',')) print('Colors in color-list1 not contained in color-list2 are: ',list(colors1.difference(colors2)))



```python
colors1=set((input('Enter colors separated by commas: ')).split(','))
colors2=set((input('Enter colors separated by commas: ')).split(','))
print('Colors in color-list1 not contained in color-list2 are: ',list(colors1.difference(colors2)))
```

```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe "C:/Users/micromedia02/PycharmProjects/pythonProject5/17co1 15.py"
Enter colors separated by commas: red
Enter colors separated by commas: blue
Colors in color-list1 not contained in color-list2 are:  ['red']

Process finished with exit code 0
```

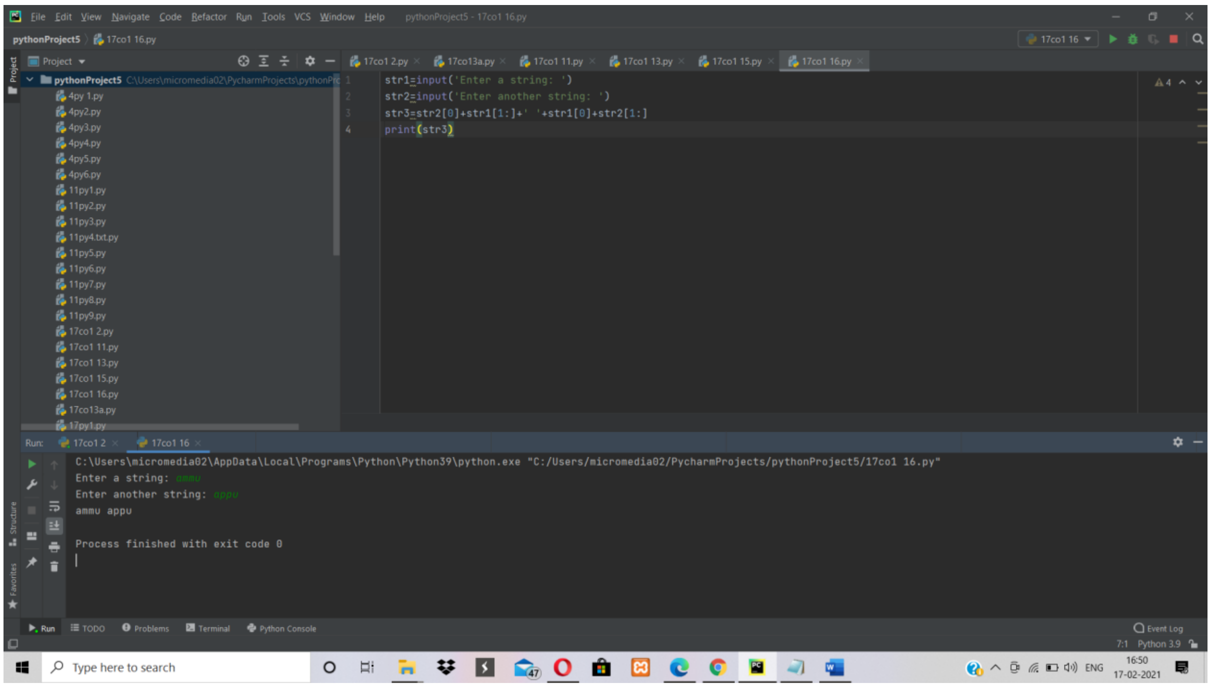
16. Create a single string separated with space from two strings by swapping the character at position 1.

str1=input('Enter a string: ')

str2=input('Enter another string: ')

str3=str2[0]+str1[1:]+' '+str1[0]+str2[1:]

print(str3)



```python
str1=input('Enter a string: ')
str2=input('Enter another string: ')
str3=str2[0]+str1[1:]+' '+str1[0]+str2[1:]
print(str3)
```

```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe "C:/Users/micromedia02/PycharmProjects/pythonProject5/17co1 16.py"
Enter a string: ammu
Enter another string: appu
ammu appu

Process finished with exit code 0
```

CO3:

2. Create a package graphics with modules rectangle, circle and sub-package 3D-graphics with modules cuboid and sphere. Include methods to find area and perimeter of respective figures in each module. Write programs that finds area and perimeter of figures by different importing statements. (Include selective import of modules and import * statements)

Circle

```
def area(r):
    print('Area of circle with radius',r,'is:','%.2f'%(3.14*r*r),'Sq.units')
def circumference(r):
    print('Circumference of circle with radius',r,'is:','%.2f'%(3.14*2*r),'units')
```

area

```
import circle
from rectangle import *
from Graphics._3D_graphics import cuboid,sphere
a=float(input('Enter length of the rectangle: '))
b=float(input('Enter breadth of the rectangle: '))
area(a,b)
r=float(input('Enter the radius of the circle: '))
circle.area(r)
l=float(input('Enter length of the cuboid: '))
b=float(input('Enter breadth of the cuboid: '))
h=float(input('Enter height of the cuboid: '))
cuboid.area(l,b,h)
r=float(input('Enter the radius of the sphere: '))
sphere.area(r)
```

perimerter

```
import circle
from rectangle import *
from Graphics._3D_graphics import cuboid,sphere
a=float(input('Enter length of the rectangle: '))
b=float(input('Enter breadth of the rectangle: '))
perimeter(a,b)
r=float(input('Enter the radius of the circle: '))
```

```
circle.circumference(r)

l=float(input('Enter length of the cuboid: '))

b=float(input('Enter breadth of the cuboid: '))

h=float(input('Enter height of the cuboid: '))

cuboid.perimeter(l,b,h)

r=float(input('Enter the radius of the sphere: '))

sphere.perimeter(r) import circle

from rectangle import *

from Graphics._3D_graphics import cuboid,sphere

a=float(input('Enter length of the rectangle: '))

b=float(input('Enter breadth of the rectangle: '))

perimeter(a,b)

r=float(input('Enter the radius of the circle: '))

circle.circumference(r)

l=float(input('Enter length of the cuboid: '))

b=float(input('Enter breadth of the cuboid: '))

h=float(input('Enter height of the cuboid: '))

cuboid.perimeter(l,b,h)

r=float(input('Enter the radius of the sphere: '))

sphere.perimeter(r)
```

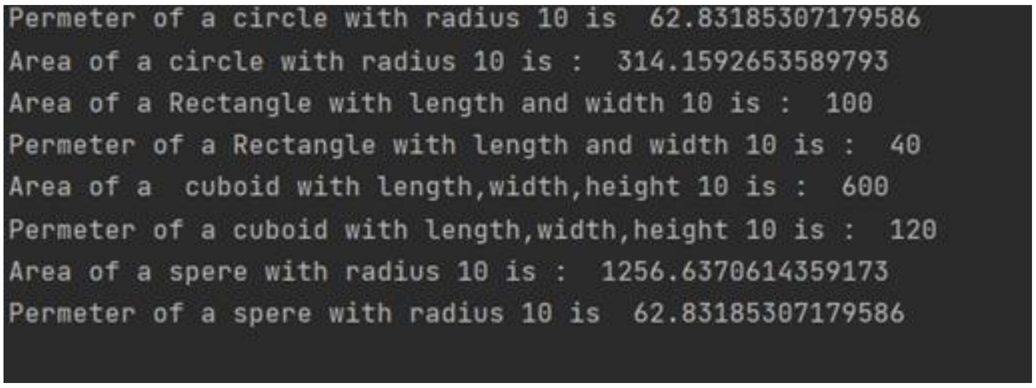
rectangle

```
def area(a,b):

   print('Area of rectangle with sides',a,'and',b,'is: ','%.2f'%(a*b),'Sq.units')

def perimeter(a,b):

   print('Perimeter of rectangle with sides',a,'and',b,'is:','%.2f'%(2*(a+b)),'units')
```

3d graphics

Cuboid

```
def area(l,b,h):

   print('Total surface area of cuboid with
dimensions',l,',',b,',',h,'is:','%.2f'%(2*((l*b)+(b*h)+(l*h))),'Sq.units')

def perimeter(l,b,h):
    print('Perimeter of cuboid with dimensions', l, ',', b, ',', h, 'is:','%.2f'%(4*(l+b+h)),'units')
sphere
def area(r):
    print('Area of sphere with radius',r,'is:','%.2f'%(4*(3.14*r*r)),'Sq.units')
def perimeter(r):
    print('Perimeter of (great circle of) sphere with radius',r,'is:','%.2f'%(2*3.14*r),'units')
```



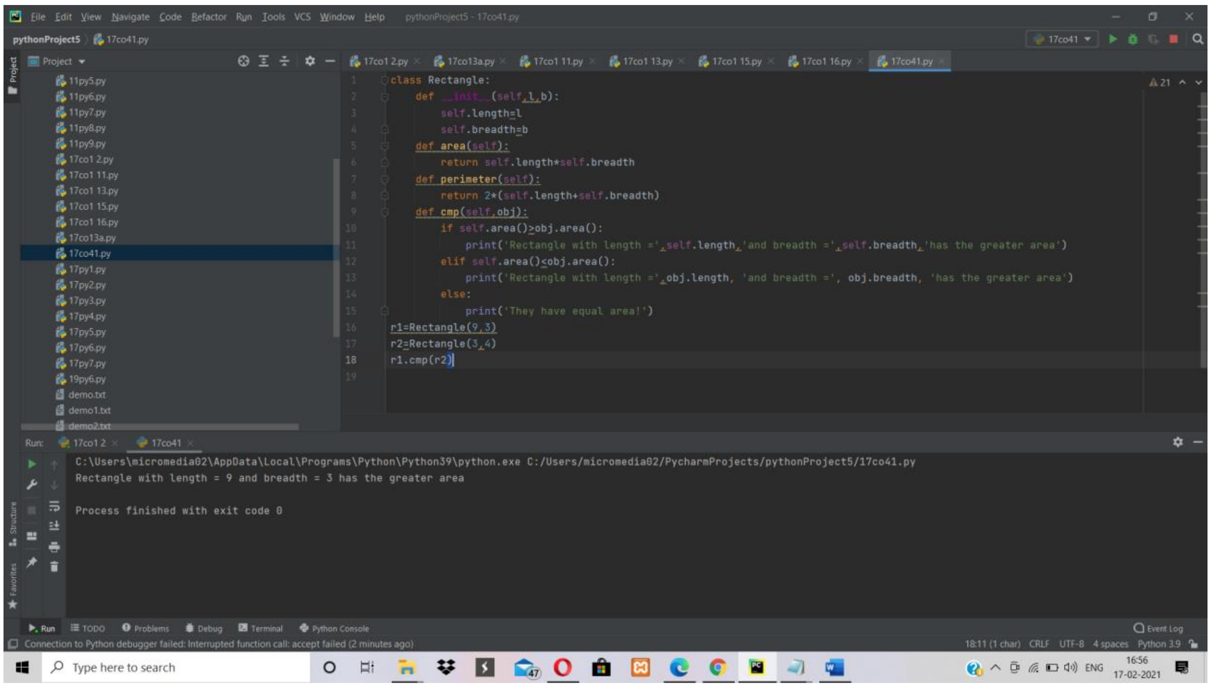
```
Permeter of a circle with radius 10 is  62.83185307179586
Area of a circle with radius 10 is :  314.1592653589793
Area of a Rectangle with length and width 10 is :  100
Permeter of a Rectangle with length and width 10 is :  40
Area of a  cuboid with length,width,height 10 is :  600
Permeter of a cuboid with length,width,height 10 is :  120
Area of a spere with radius 10 is :  1256.6370614359173
Permeter of a spere with radius 10 is  62.83185307179586
```

Course Outcome 4 (CO4):

1. Create Rectangle class with attributes length and breadth and methods to find area and perimeter. Compare two Rectangle objects by their area.

```
class Rectangle:
  def __init__(self,l,b):
    self.length=l
    self.breadth=b
      def area(self):
    return self.length*self.breadth
      def perimeter(self):
    return 2*(self.length+self.breadth)
      def cmp(self,obj):
        if self.area()>obj.area():
            print('Rectangle with length =',self.length,'and breadth =',self.breadth,'has the greater
area')
        elif self.area()<obj.area():
 print('Rectangle with length =',obj.length, 'and breadth =', obj.breadth, 'has the greater area')
        else:
            print('They have equal area!')
r1=Rectangle(9,3)
r2=Rectangle(3,4)
```

```
r1.cmp(r2)
```



```
class Rectangle:
    def __init__(self,l,b):
        self.length=l
        self.breadth=b
    def area(self):
        return self.length*self.breadth
    def perimeter(self):
        return 2*(self.length+self.breadth)
    def cmp(self,obj):
        if self.area()>obj.area():
            print('Rectangle with length =',self.length,'and breadth =',self.breadth,'has the greater area')
        elif self.area()<obj.area():
            print('Rectangle with length =',obj.length, 'and breadth =', obj.breadth, 'has the greater area')
        else:
            print('They have equal area!')
r1=Rectangle(9,3)
r2=Rectangle(3,4)
r1.cmp(r2)
```

```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe C:/Users/micromedia02/PycharmProjects/pythonProject5/17co41.py
Rectangle with length = 9 and breadth = 3 has the greater area

Process finished with exit code 0
```

2.Create a Bank account with members account number, name, type of account and balance. Write constructor and methods to deposit at the bank and withdraw an amount from the bank.

```
class BankAccount:
  def __init__(self,a,n,t,b):
    self.acno=a
    self.name=n
    self.type=t
    self.bal=b
  def deposit(self,a):
    self.bal+=a
    print('Rs.',a,'deposited! Current balance is: Rs.',self.bal)
  def withdraw(self,a):
    if self.bal >= a:
      self.bal-=a
      print('Rs.',a,'withdrawn! Current balance is: Rs.', self.bal)
    else:
      print('Insufficient balance to make this transaction!')
a=int(input('Enter account number:'))
n=input('Enter name of the account holder: ')
```

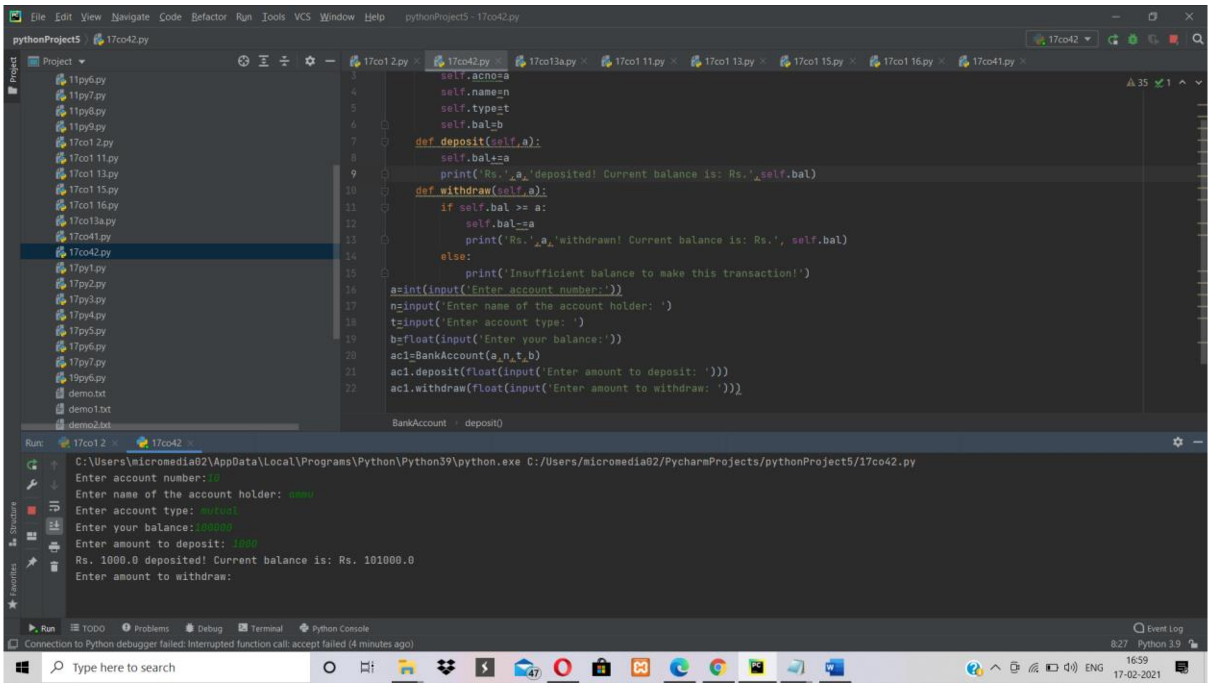
t=input('Enter account type: ')

b=float(input('Enter your balance:'))

ac1=BankAccount(a,n,t,b)

ac1.deposit(float(input('Enter amount to deposit: ')))

ac1.withdraw(float(input('Enter amount to withdraw: ')))



```
        self.acno=a
        self.name=n
        self.type=t
        self.bal=b
    def deposit(self,a):
        self.bal+=a
        print('Rs.',a,'deposited! Current balance is: Rs.',self.bal)
    def withdraw(self,a):
        if self.bal >= a:
            self.bal-=a
            print('Rs.',a,'withdrawn! Current balance is: Rs.', self.bal)
        else:
            print('Insufficient balance to make this transaction!')
a=int(input('Enter account number:'))
n=input('Enter name of the account holder: ')
t=input('Enter account type: ')
b=float(input('Enter your balance:'))
ac1=BankAccount(a,n,t,b)
ac1.deposit(float(input('Enter amount to deposit: ')))
ac1.withdraw(float(input('Enter amount to withdraw: ')))
```

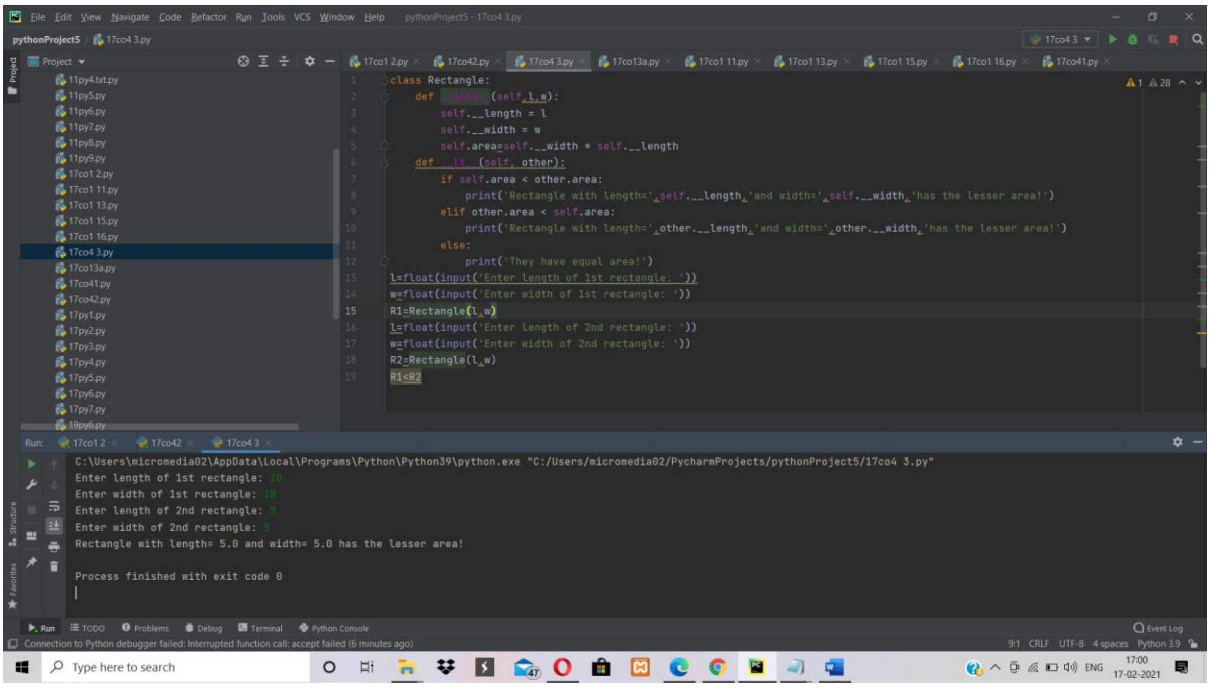
```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe C:/Users/micromedia02/PycharmProjects/pythonProject5/17co42.py
Enter account number:10
Enter name of the account holder: ammu
Enter account type: mutual
Enter your balance:100000
Enter amount to deposit: 1000
Rs. 1000.0 deposited! Current balance is: Rs. 101000.0
Enter amount to withdraw:
```

Connection to Python debugger failed: Interrupted function call: accept failed (4 minutes ago)

3.Create a class Rectangle with private attributes length and width. Overload '

```
class Rectangle:
   def __init__(self,l,w):
      self.__length = l
      self.__width = w
      self.area=self.__width * self.__length
   def __lt__(self, other):
      if self.area < other.area:
         print('Rectangle with length=',self.__length,'and width=',self.__width,'has the lesser area!')
      elif other.area < self.area:
         print('Rectangle with length=',other.__length,'and width=',other.__width,'has the lesser area!')
      else:
         print('They have equal area!')
```

```
l=float(input('Enter length of 1st rectangle: '))

w=float(input('Enter width of 1st rectangle: '))

R1=Rectangle(l,w)

l=float(input('Enter length of 2nd rectangle: '))

w=float(input('Enter width of 2nd rectangle: '))

R2=Rectangle(l,w)

R1<R2
```



```
class Rectangle:
    def __init__(self,l,w):
        self.__length = l
        self.__width = w
        self.area=self.__width * self.__length
    def __lt__(self, other):
        if self.area < other.area:
            print('Rectangle with length=',self.__length,'and width=',self.__width,'has the lesser area!')
        elif other.area < self.area:
            print('Rectangle with length=',other.__length,'and width=',other.__width,'has the lesser area!')
        else:
            print('They have equal area!')
l=float(input('Enter length of 1st rectangle: '))
w=float(input('Enter width of 1st rectangle: '))
R1=Rectangle(l,w)
l=float(input('Enter length of 2nd rectangle: '))
w=float(input('Enter width of 2nd rectangle: '))
R2=Rectangle(l,w)
R1<R2
```

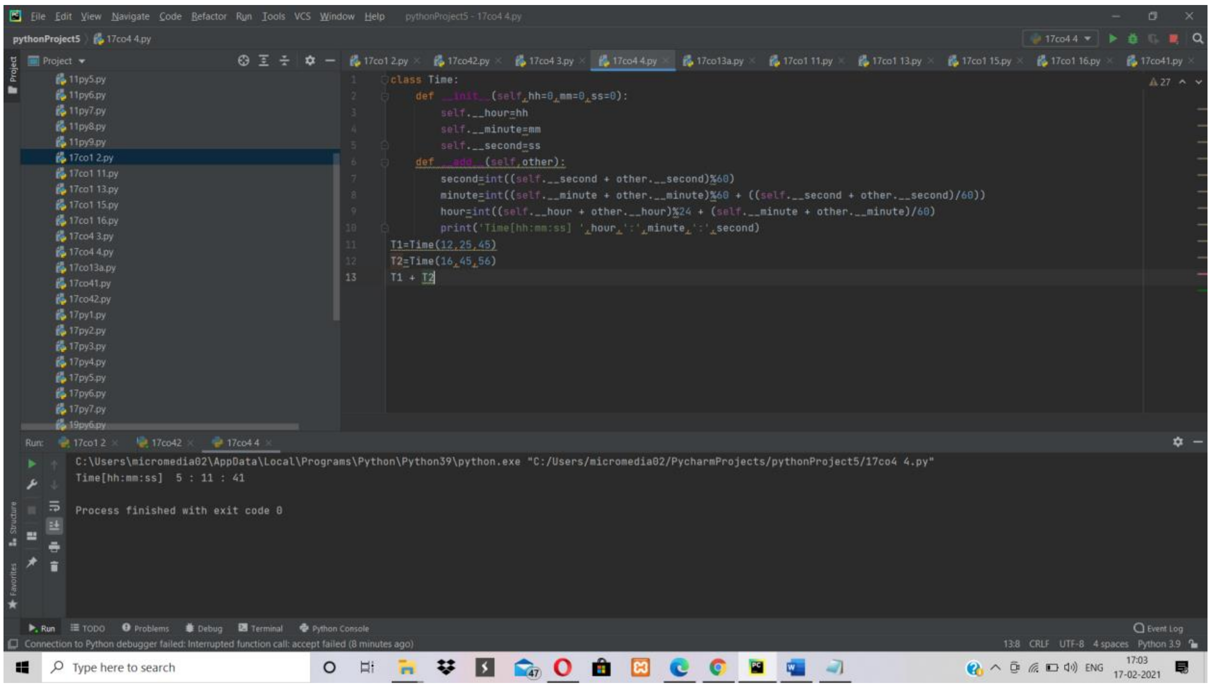
```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe "C:/Users/micromedia02/PycharmProjects/pythonProject5/17co4 3.py"
Enter length of 1st rectangle: 10
Enter width of 1st rectangle: 10
Enter length of 2nd rectangle: 5
Enter width of 2nd rectangle: 5
Rectangle with length= 5.0 and width= 5.0 has the lesser area!

Process finished with exit code 0
```

4.Create a class Time with private attributes hour, minute and second. Overload ‘+’ operator to find sum of 2 time.

```
class Time:

   def __init__(self,hh=0,mm=0,ss=0):

      self.__hour=hh

      self.__minute=mm

      self.__second=ss

   def __add__(self,other):

      second=int((self.__second + other.__second)%60)

      minute=int((self.__minute + other.__minute)%60 + ((self.__second + other.__second)/60))

      hour=int((self.__hour + other.__hour)%24 + (self.__minute + other.__minute)/60)

      print('Time[hh:mm:ss] ',hour,':',minute,':',second)

T1=Time(12,25,45)
```

T2=Time(16,45,56)

T1 + T2

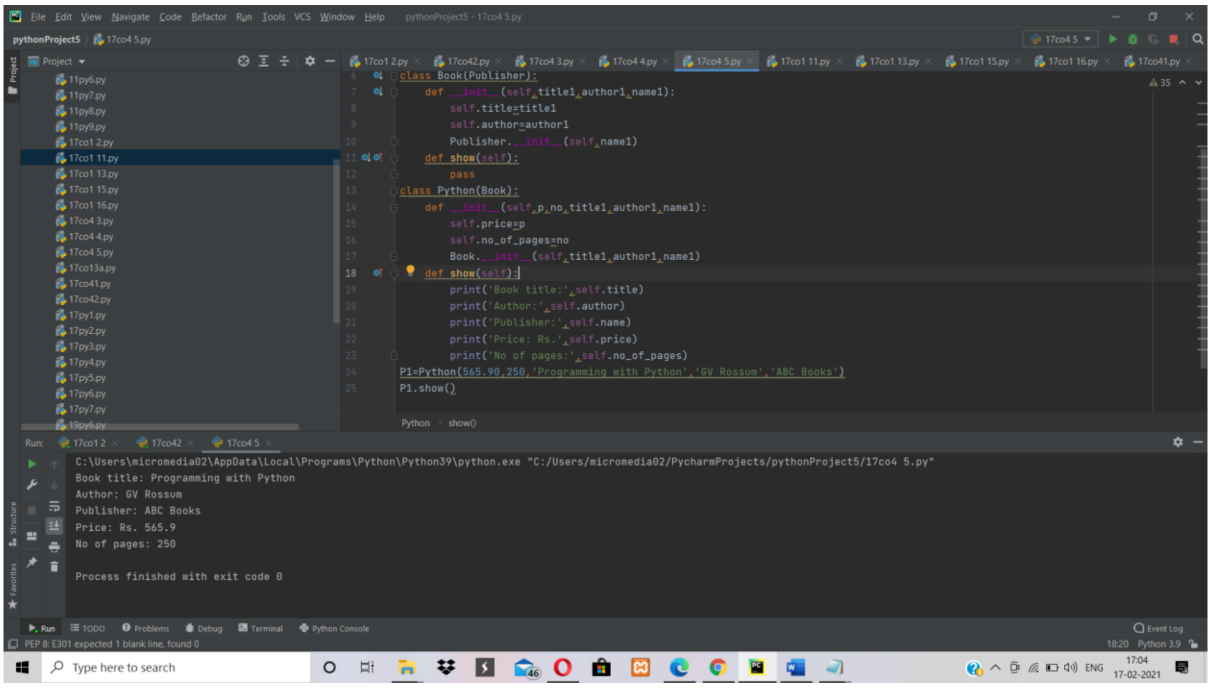


```
class Time:
    def __init__(self,hh=0,mm=0,ss=0):
        self.__hour=hh
        self.__minute=mm
        self.__second=ss
    def __add__(self,other):
        second=int((self.__second + other.__second)%60)
        minute=int((self.__minute + other.__minute)%60 + ((self.__second + other.__second)/60))
        hour=int((self.__hour + other.__hour)%24 + (self.__minute + other.__minute)/60)
        print('Time[hh:mm:ss] ',hour,':',minute,':',second)
T1=Time(12,25,45)
T2=Time(16,45,56)
T1 + T2
```

```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe "C:/Users/micromedia02/PycharmProjects/pythonProject5/17co4 4.py"
Time[hh:mm:ss]  5 : 11 : 41

Process finished with exit code 0
```

5.Create a class Publisher (name). Derive class Book from Publisher with attributes title and author. Derive class Python from Book with attributes price and no_of_pages. Write a program that displays information about a Python book. Use base class constructor invocation and method overriding

```
class Publisher:

   def __init__(self,name1):

      self.name=name1

   def show(self):

      pass

class Book(Publisher):

   def __init__(self,title1,author1,name1):

      self.title=title1

      self.author=author1

      Publisher.__init__(self,name1)

   def show(self):

      pass

class Python(Book):

   def __init__(self,p,no,title1,author1,name1):
      self.price=p

      self.no_of_pages=no

      Book.__init__(self,title1,author1,name1)

   def show(self):

      print('Book title:',self.title)

      print('Author:',self.author)

      print('Publisher:',self.name)

      print('Price: Rs.',self.price)

      print('No of pages:',self.no_of_pages)

P1=Python(565.90,250,'Programming with Python','GV Rossum','ABC Books')

P1.show()
```



```
class Book(Publisher):
    def __init__(self,title1,author1,name1):
        self.title=title1
        self.author=author1
        Publisher.__init__(self,name1)
    def show(self):
        pass
class Python(Book):
    def __init__(self,p,no,title1,author1,name1):
        self.price=p
        self.no_of_pages=no
        Book.__init__(self,title1,author1,name1)
    def show(self):
        print('Book title:',self.title)
        print('Author:',self.author)
        print('Publisher:',self.name)
        print('Price: Rs.',self.price)
        print('No of pages:',self.no_of_pages)
P1=Python(565.90,250,'Programming with Python','GV Rossum','ABC Books')
P1.show()
```

```
C:\Users\micromedia02\AppData\Local\Programs\Python\Python39\python.exe "C:/Users/micromedia02/PycharmProjects/pythonProject5/17co4 5.py"
Book title: Programming with Python
Author: GV Rossum
Publisher: ABC Books
Price: Rs. 565.9
No of pages: 250

Process finished with exit code 0
```

PEP 8: E301 expected 1 blank line, found 0