Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

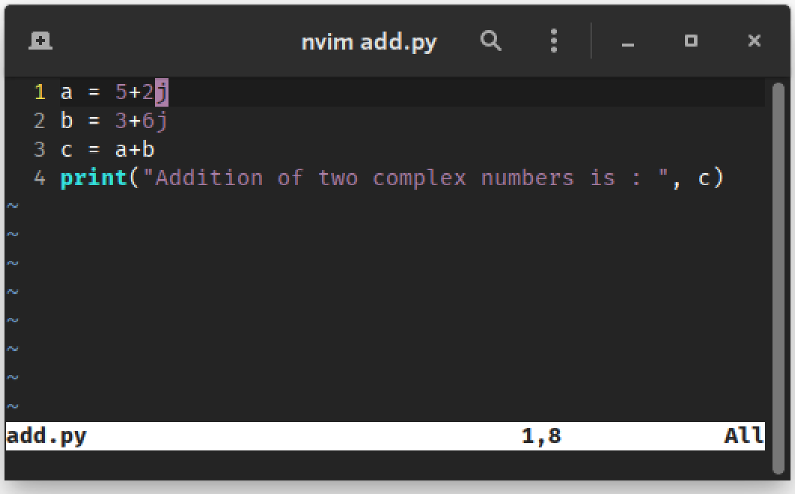
Practical No : 1

Experiment No : 1

Aim : Write a program to show the arithmetic operations of complex number.

1) Addition :

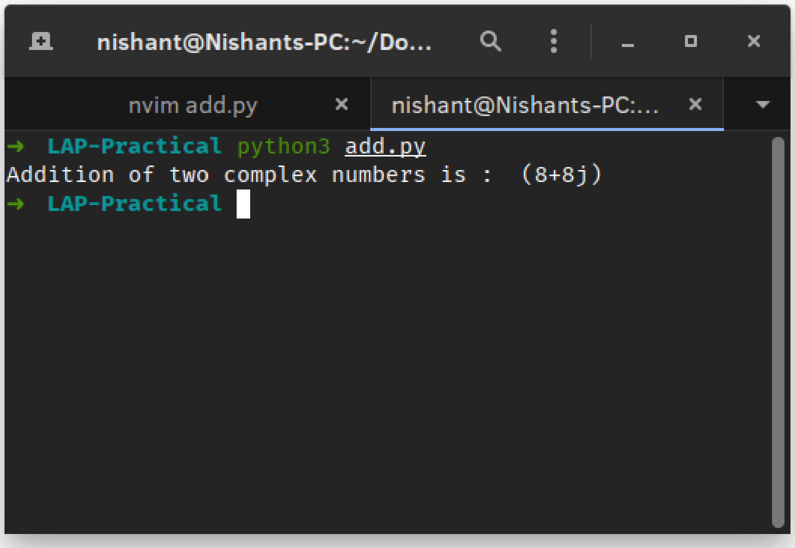
Source Code :



```
a = 5+2j
b = 3+6j
c = a+b
print("Addition of two complex numbers is : ", c)
```

```
add.py                                              1,8            All
```

Output :

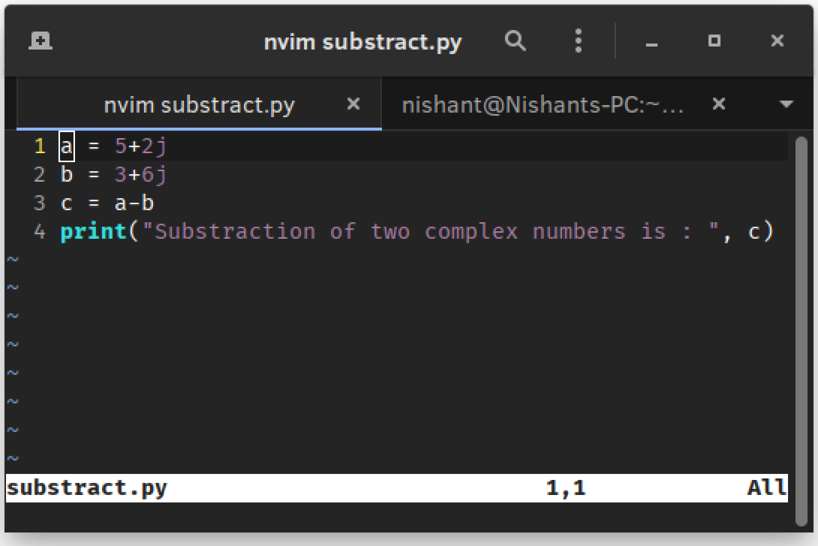


```
→  LAP-Practical python3 add.py
Addition of two complex numbers is :  (8+8j)
→  LAP-Practical
```

Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

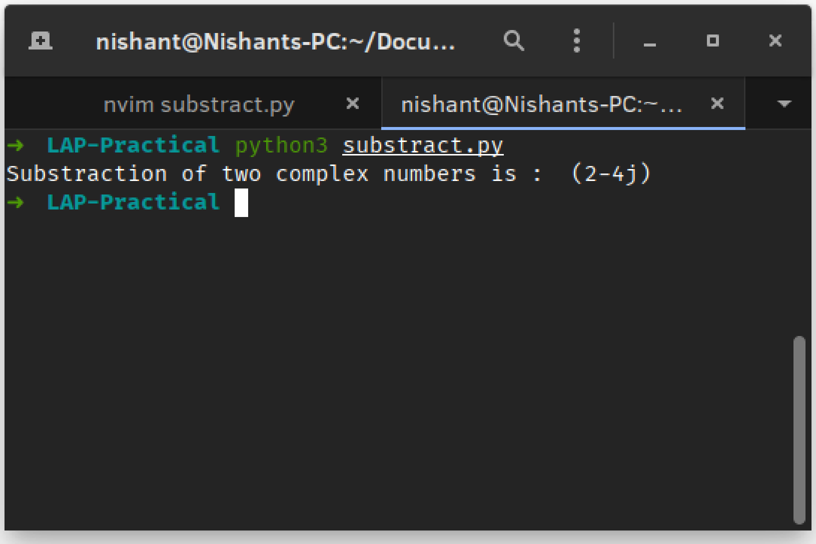
2) Substraction :

Source Code :



```
a = 5+2j
b = 3+6j
c = a-b
print("Substraction of two complex numbers is : ", c)
```

Output :

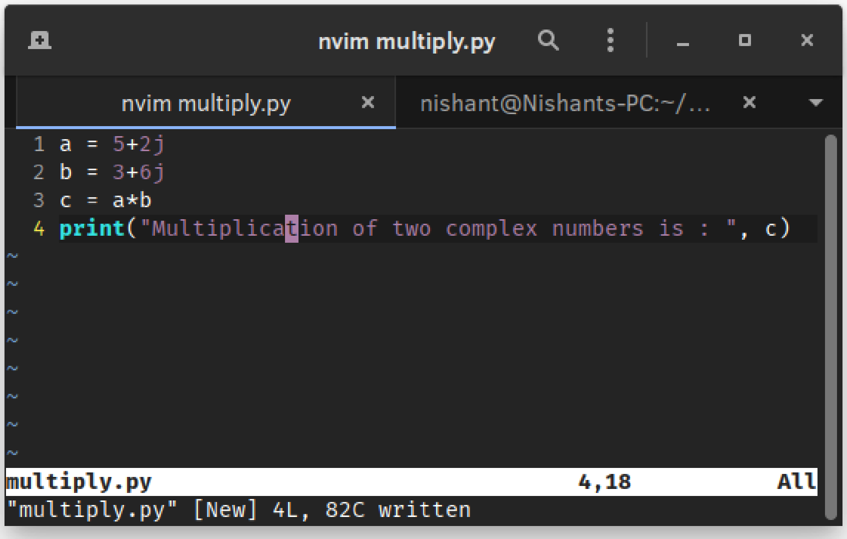


```
➜  LAP-Practical python3 substract.py
Substraction of two complex numbers is :  (2-4j)
➜  LAP-Practical
```

Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

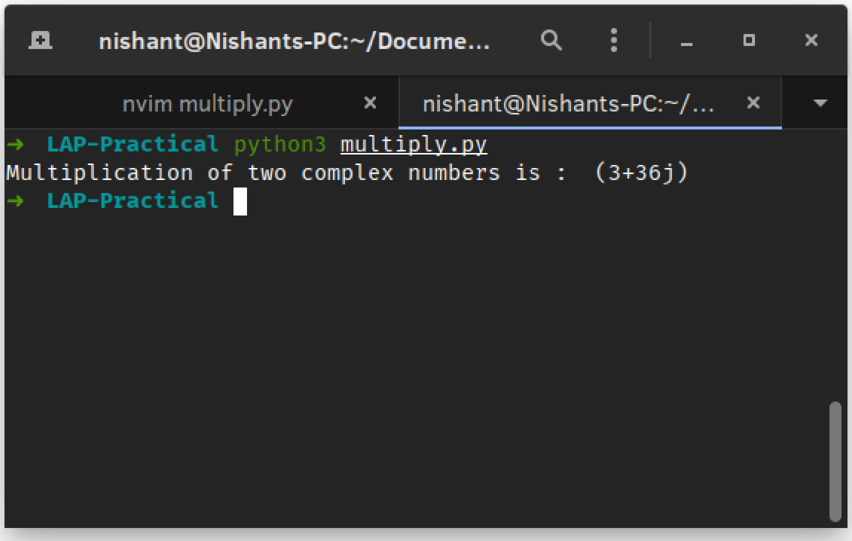
3) Multiplication:

Souce Code:



```
a = 5+2j
b = 3+6j
c = a*b
print("Multiplication of two complex numbers is : ", c)
~
~
~
~
~
~
~
~
multiply.py                                        4,18          All
"multiply.py" [New] 4L, 82C written
```

Output:

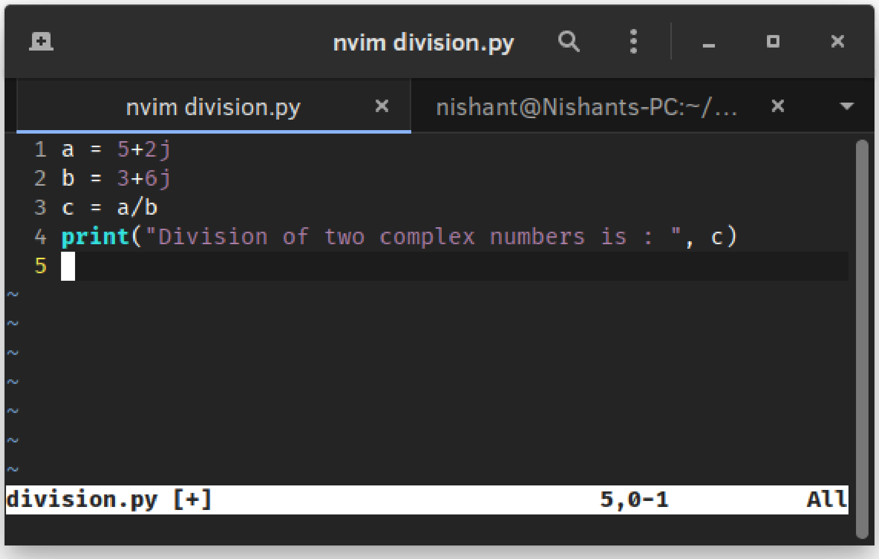


```
➜  LAP-Practical python3 multiply.py
Multiplication of two complex numbers is :  (3+36j)
➜  LAP-Practical 
```

Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

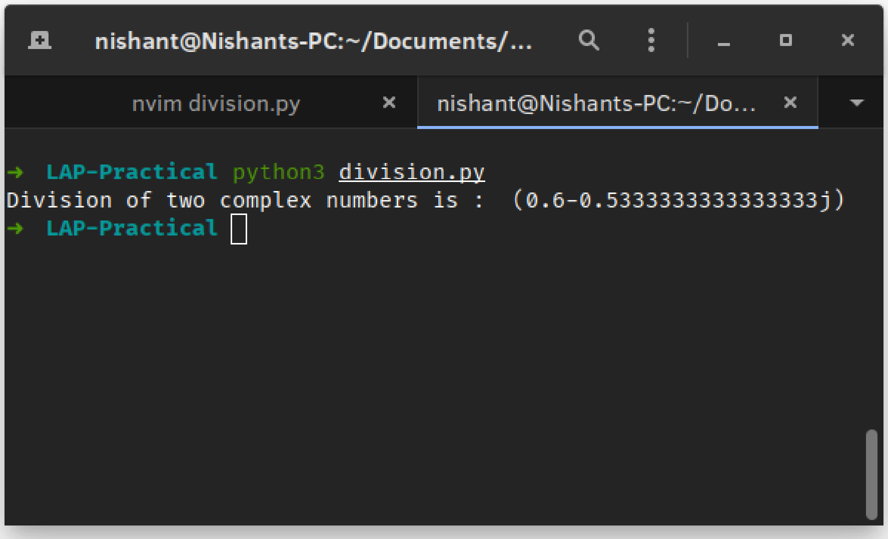
4) Division:

Souce Code:



```python
a = 5+2j
b = 3+6j
c = a/b
print("Division of two complex numbers is : ", c)
```

Output:


nishant@Nishants-PC:~/Documents/...
nvim division.py
nishant@Nishants-PC:~/Do...

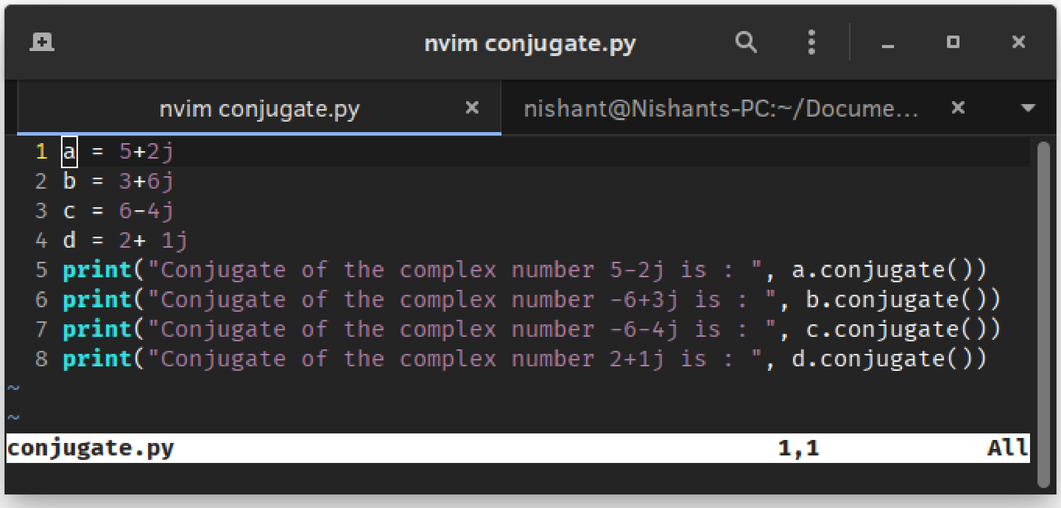
```
➜  LAP-Practical python3 division.py
Division of two complex numbers is :  (0.6-0.5333333333333333j)
➜  LAP-Practical
```

Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

Experiment No : 2

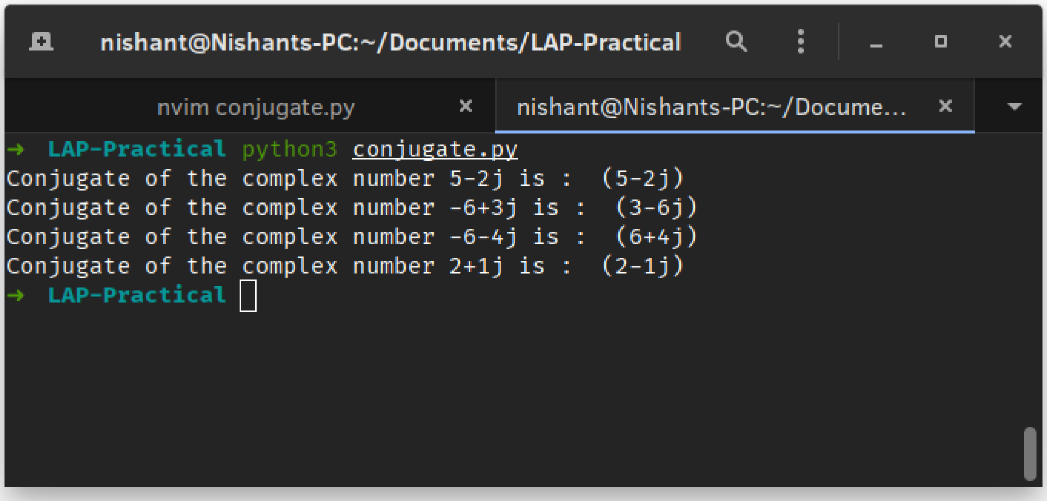
Aim : to display the conjugate of a Complex Number.

Source Code :



```
a = 5+2j
b = 3+6j
c = 6-4j
d = 2+ 1j
print("Conjugate of the complex number 5-2j is : ", a.conjugate())
print("Conjugate of the complex number -6+3j is : ", b.conjugate())
print("Conjugate of the complex number -6-4j is : ", c.conjugate())
print("Conjugate of the complex number 2+1j is : ", d.conjugate())
~
~
```

Output:


nishant@Nishants-PC:~/Documents/LAP-Practical
nvim conjugate.py
nishant@Nishants-PC:~/Docume...

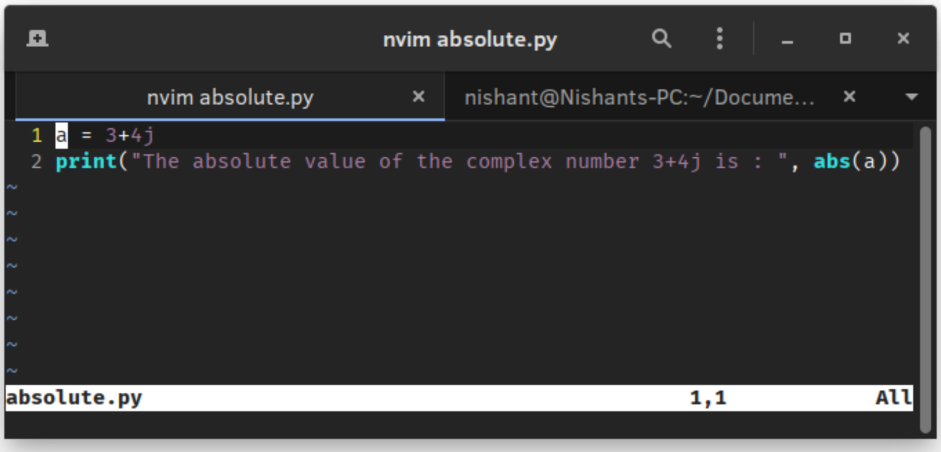
```
➜  LAP-Practical python3 conjugate.py
Conjugate of the complex number 5-2j is :  (5-2j)
Conjugate of the complex number -6+3j is :  (3-6j)
Conjugate of the complex number -6-4j is :  (6+4j)
Conjugate of the complex number 2+1j is :  (2-1j)
➜  LAP-Practical 
```

Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

Experiment No : 3

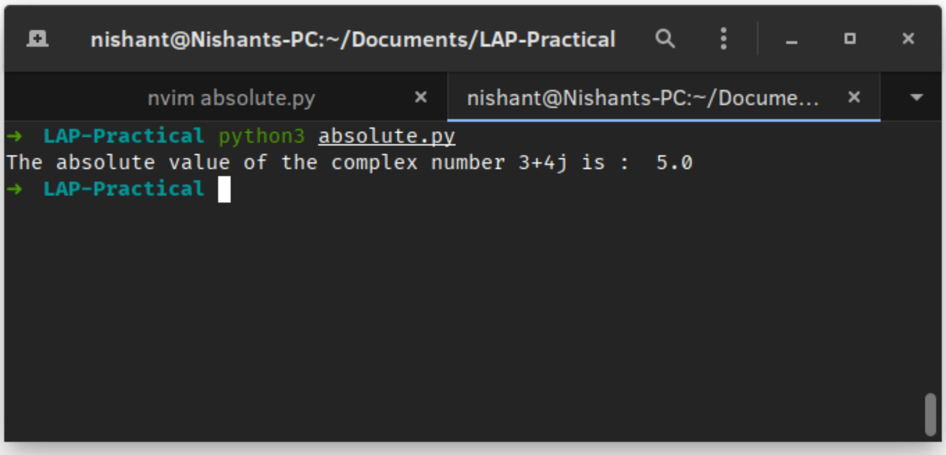
Aim: Displaying absolute values of a Complex Number.

Source Code:



```
a = 3+4j
print("The absolute value of the complex number 3+4j is : ", abs(a))
~
~
~
~
~
~
~
~
absolute.py                                    1,1          All
```

Output:



nishant@Nishants-PC:~/Documents/LAP-Practical
nvim absolute.py
nishant@Nishants-PC:~/Docume...

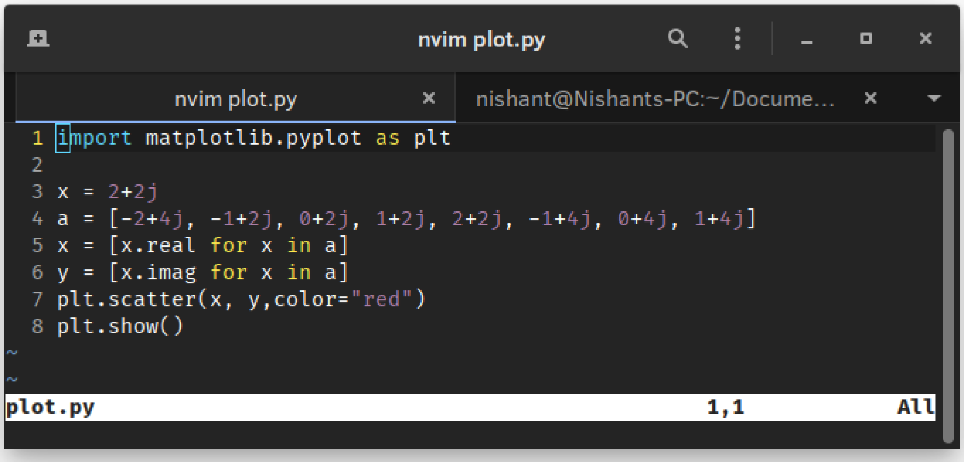
```
➜  LAP-Practical python3 absolute.py
The absolute value of the complex number 3+4j is :  5.0
➜  LAP-Practical
```

Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

Experiment No : 4

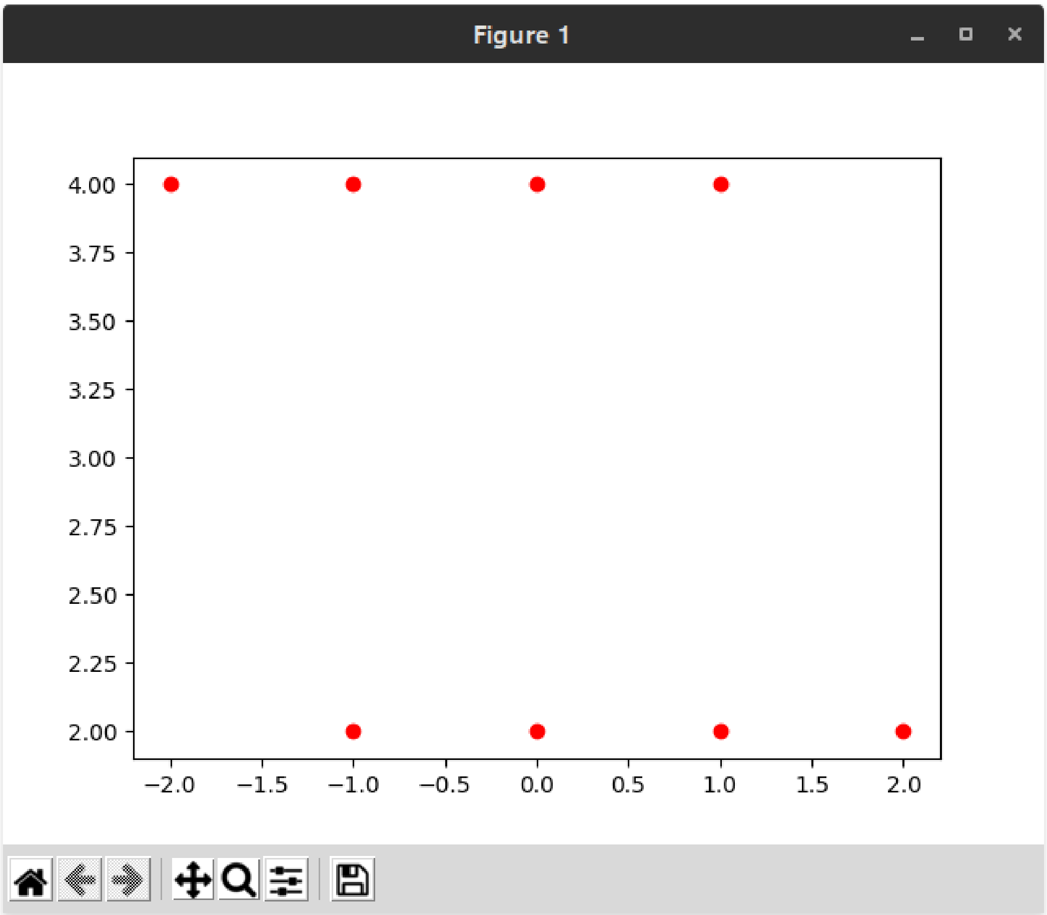
Aim: Plotting a set of Complex Numbers.

Source Code:



```python
import matplotlib.pyplot as plt

x = 2+2j
a = [-2+4j, -1+2j, 0+2j, 1+2j, 2+2j, -1+4j, 0+4j, 1+4j]
x = [x.real for x in a]
y = [x.imag for x in a]
plt.scatter(x, y,color="red")
plt.show()
```

Output:



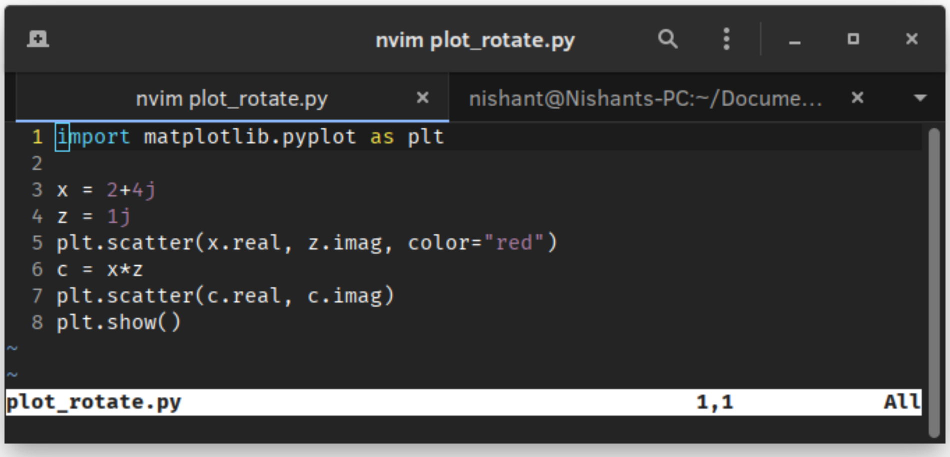
Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

Experiment No : 5

Aim: Creating a new plot by rotating the given number by a degree 90,180,270 degrees and also by scaling by a number a = 1/2, a = 1/3, a = 2 etc.

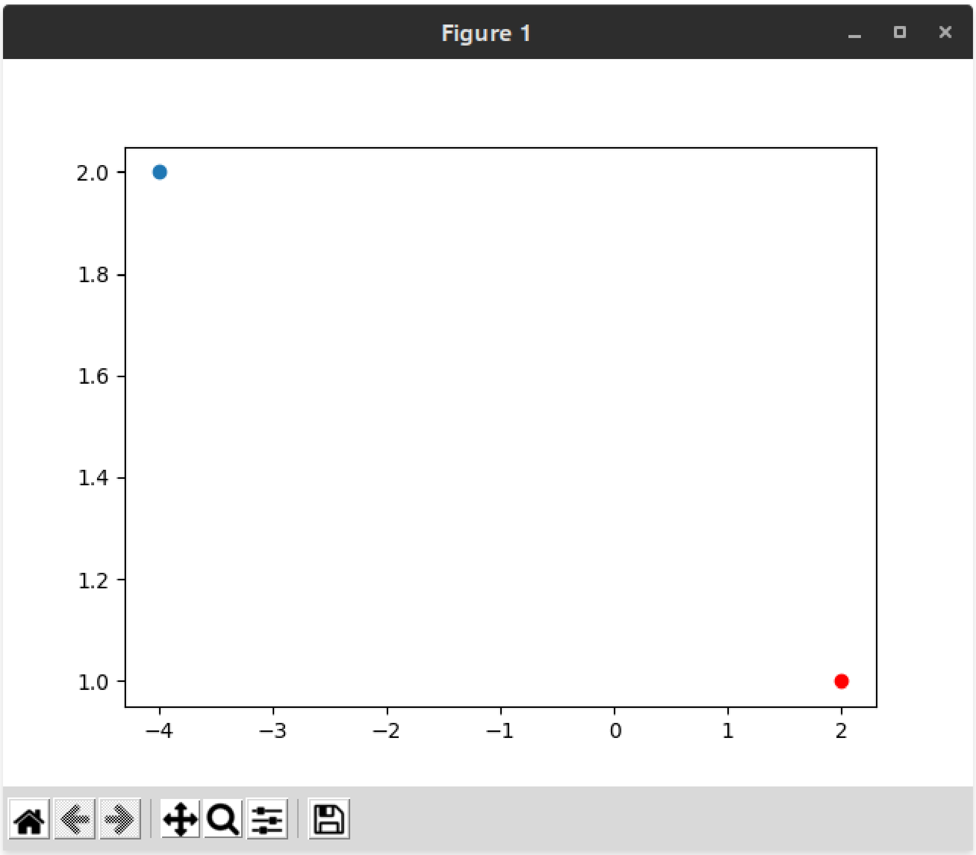
Rotation by 90:

Source Code:



```
import matplotlib.pyplot as plt

x = 2+4j
z = 1j
plt.scatter(x.real, z.imag, color="red")
c = x*z
plt.scatter(c.real, c.imag)
plt.show()
```

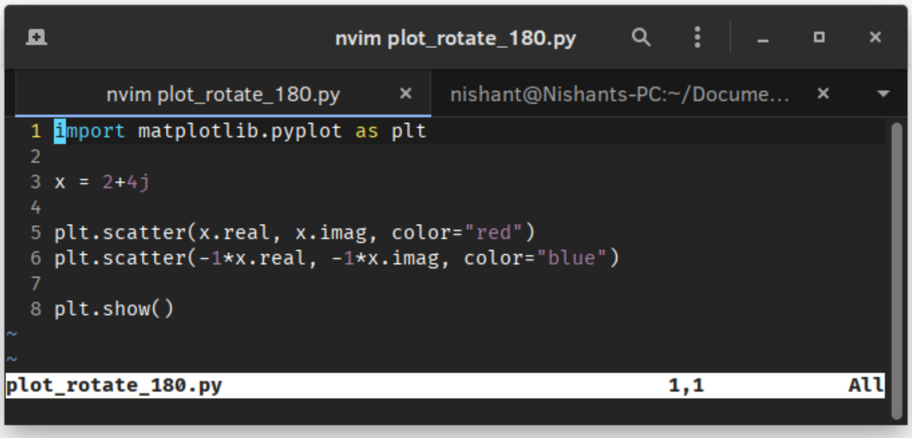
Output:



Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

Rotation by 180:

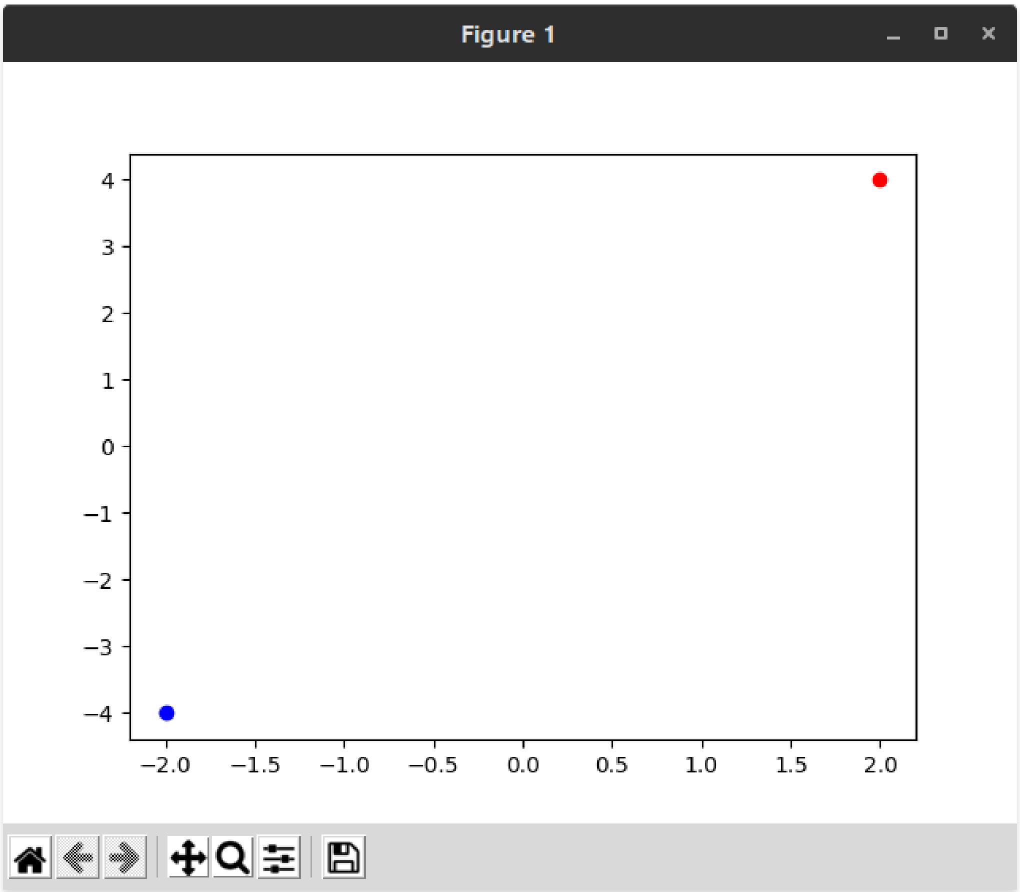
Source Code:



```
import matplotlib.pyplot as plt

x = 2+4j

plt.scatter(x.real, x.imag, color="red")
plt.scatter(-1*x.real, -1*x.imag, color="blue")

plt.show()
```

```
plot_rotate_180.py                                    1,1          All
```

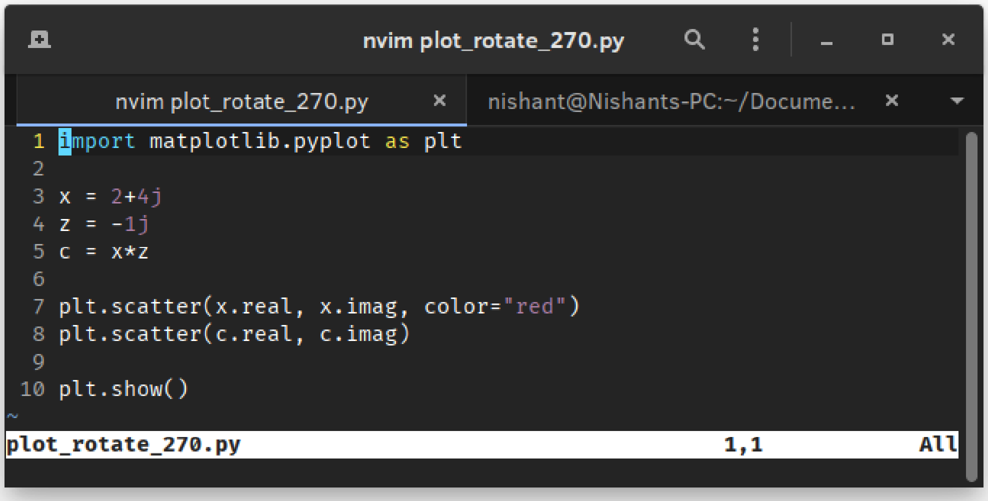
Output:



Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

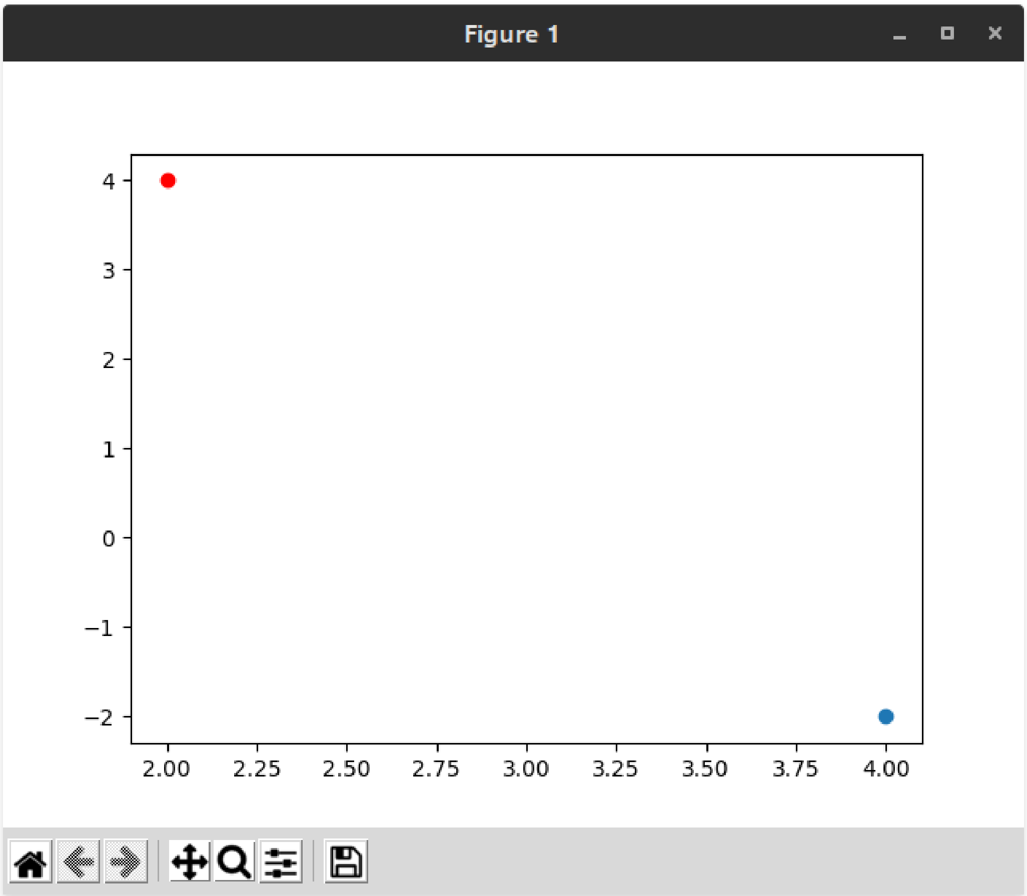
Rotation by 270:

Source Code:



```python
import matplotlib.pyplot as plt

x = 2+4j
z = -1j
c = x*z

plt.scatter(x.real, x.imag, color="red")
plt.scatter(c.real, c.imag)

plt.show()
```

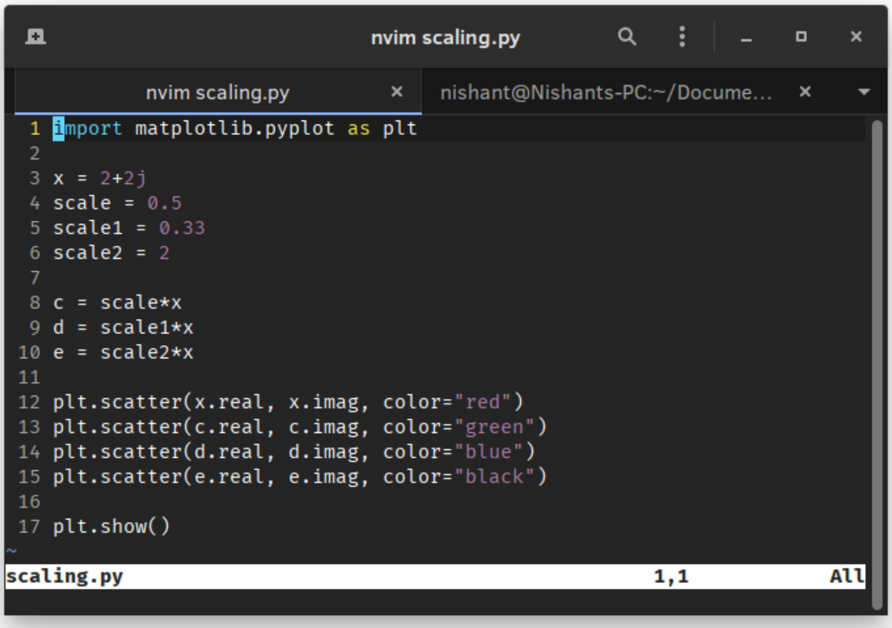
Output:



Name : Nishant Bhandari
Class : SYCS
Roll No : 06
Subject : Linear Algebra Using Python

Scaling by a=1/2, a=1/3 and a=2:

Source Code:



```
import matplotlib.pyplot as plt

x = 2+2j
scale = 0.5
scale1 = 0.33
scale2 = 2

c = scale*x
d = scale1*x
e = scale2*x

plt.scatter(x.real, x.imag, color="red")
plt.scatter(c.real, c.imag, color="green")
plt.scatter(d.real, d.imag, color="blue")
plt.scatter(e.real, e.imag, color="black")

plt.show()
```

Output:

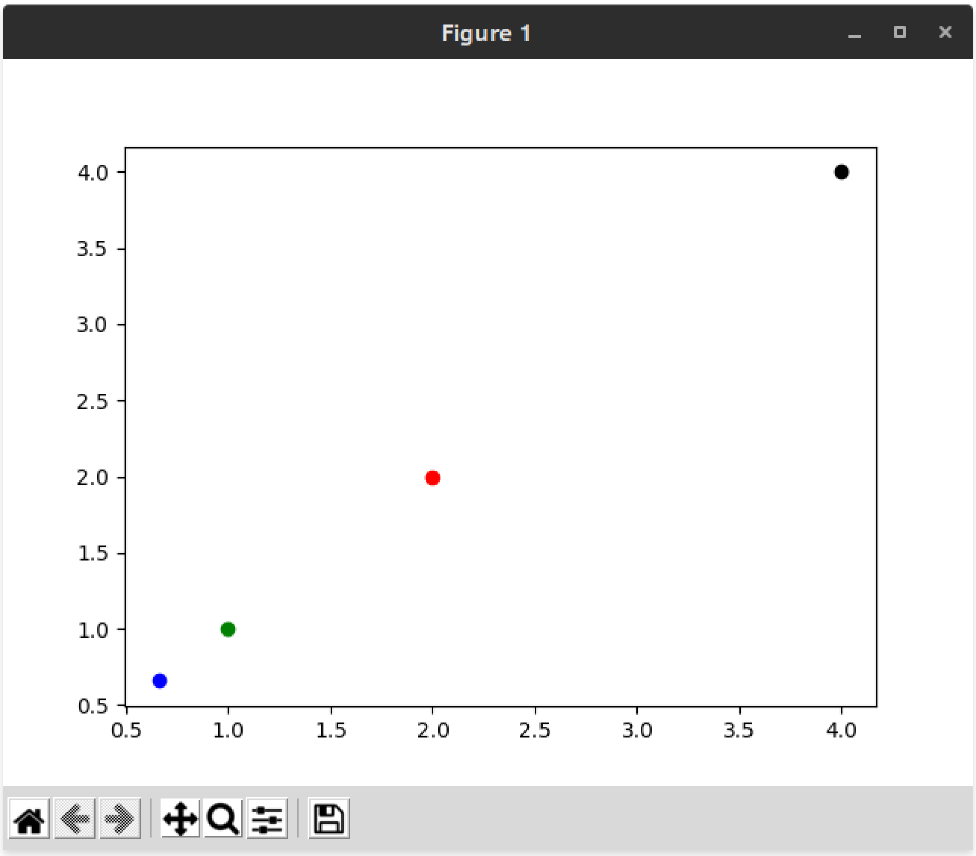


Figure 1