PYTHON LAB CAT 1

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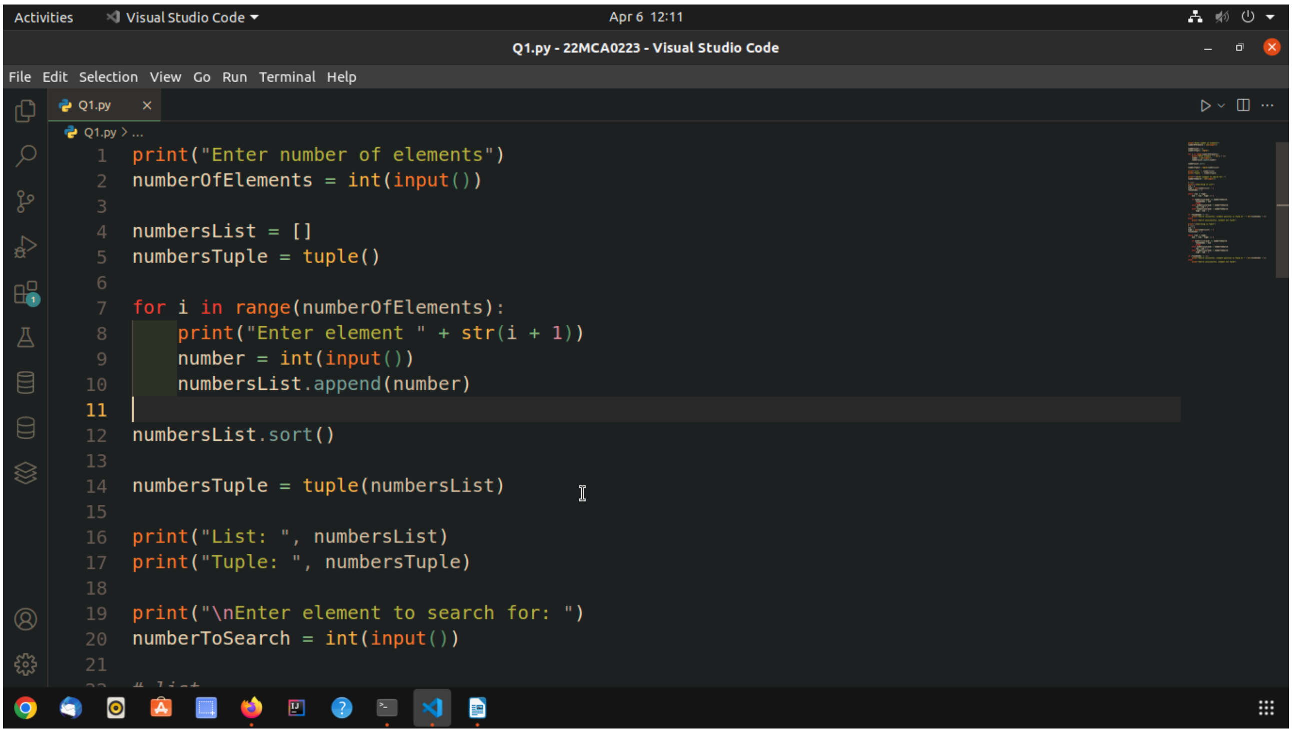
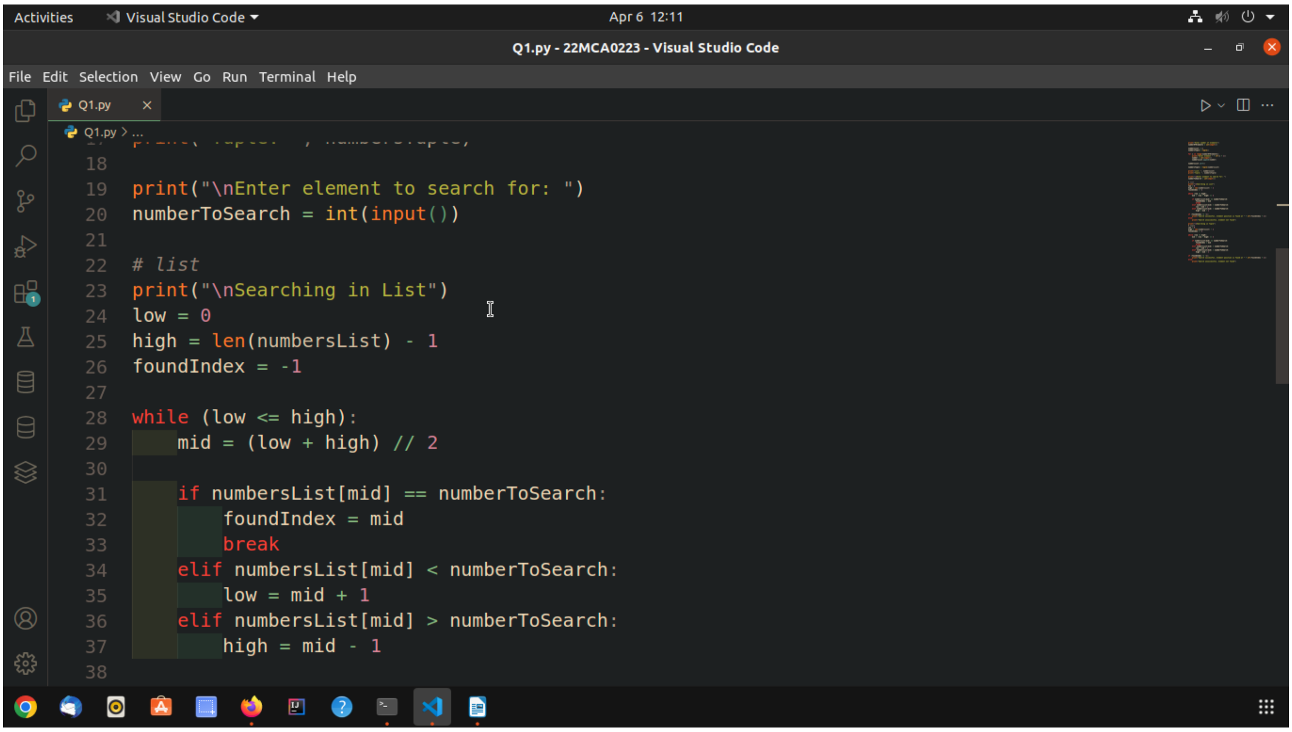
Question 1 (7 Marks)
Write a python program to implement binary search using both list and tuples and find the position of the element.
Output format:
Search successful, element position is found at ‘x’


Activities
Visual Studio Code
Apr 6 12:11
Q1.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Q1.py
Q1.py > ...

```python
print("Enter number of elements")
numberOfElements = int(input())

numbersList = []
numbersTuple = tuple()

for i in range(numberOfElements):
    print("Enter element " + str(i + 1))
    number = int(input())
    numbersList.append(number)

numbersList.sort()

numbersTuple = tuple(numbersList)

print("List: ", numbersList)
print("Tuple: ", numbersTuple)

print("\nEnter element to search for: ")
numberToSearch = int(input())

```


Activities
Visual Studio Code
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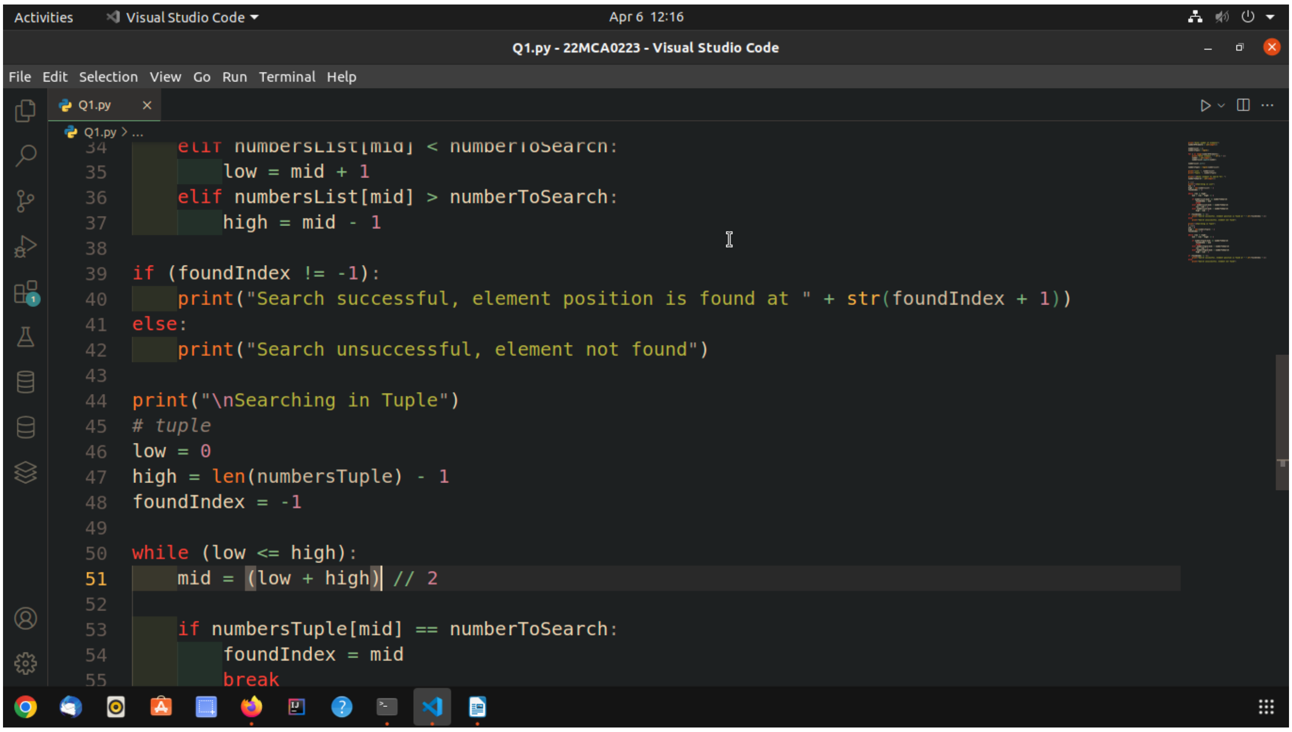
Q1.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Q1.py
Q1.py > ...

```python

print("\nEnter element to search for: ")
numberToSearch = int(input())

# list
print("\nSearching in List")
low = 0
high = len(numbersList) - 1
foundIndex = -1

while (low <= high):
    mid = (low + high) // 2

    if numbersList[mid] == numberToSearch:
        foundIndex = mid
        break
    elif numbersList[mid] < numberToSearch:
        low = mid + 1
    elif numbersList[mid] > numberToSearch:
        high = mid - 1

```


Activities
Visual Studio Code
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Q1.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Q1.py
Q1.py > ...

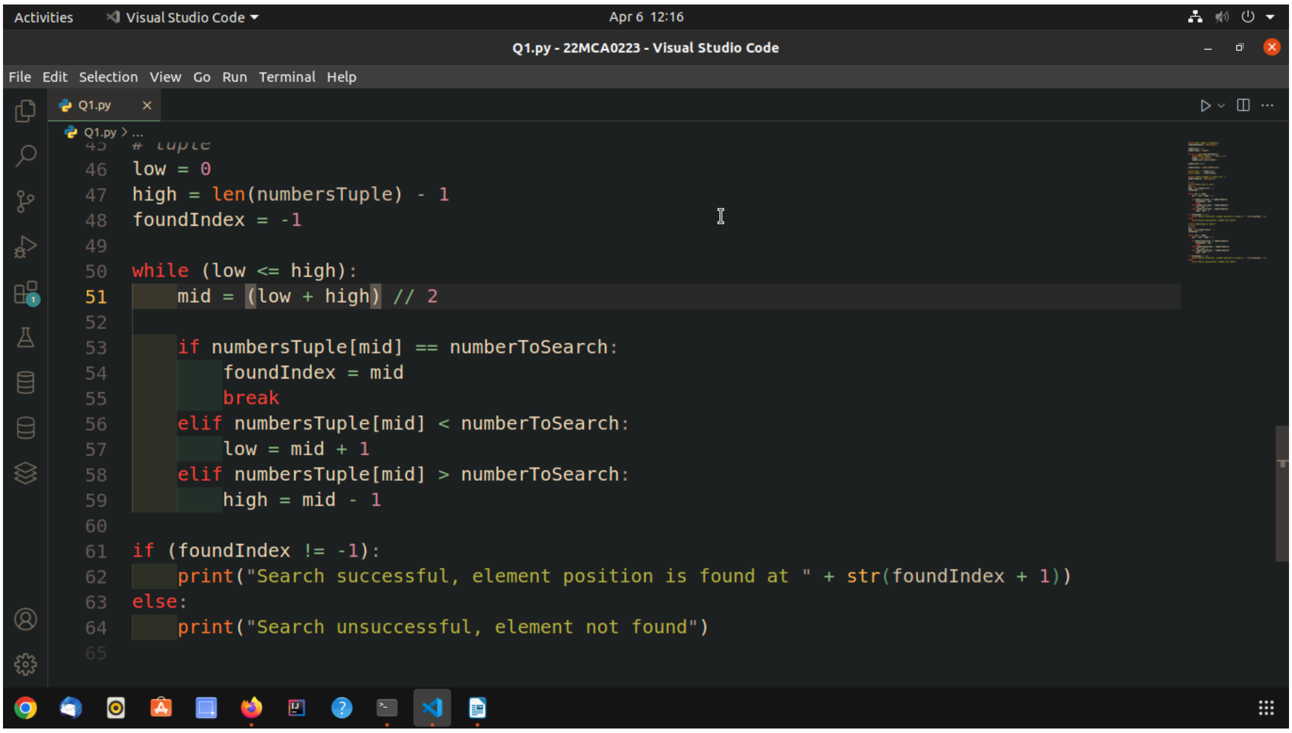
```
    elif numbersList[mid] < numberToSearch:
        low = mid + 1
    elif numbersList[mid] > numberToSearch:
        high = mid - 1

if (foundIndex != -1):
    print("Search successful, element position is found at " + str(foundIndex + 1))
else:
    print("Search unsuccessful, element not found")

print("\nSearching in Tuple")
# tuple
low = 0
high = len(numbersTuple) - 1
foundIndex = -1

while (low <= high):
    mid = (low + high) // 2

    if numbersTuple[mid] == numberToSearch:
        foundIndex = mid
        break
```


Activities
Visual Studio Code
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Q1.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Q1.py
Q1.py > ...

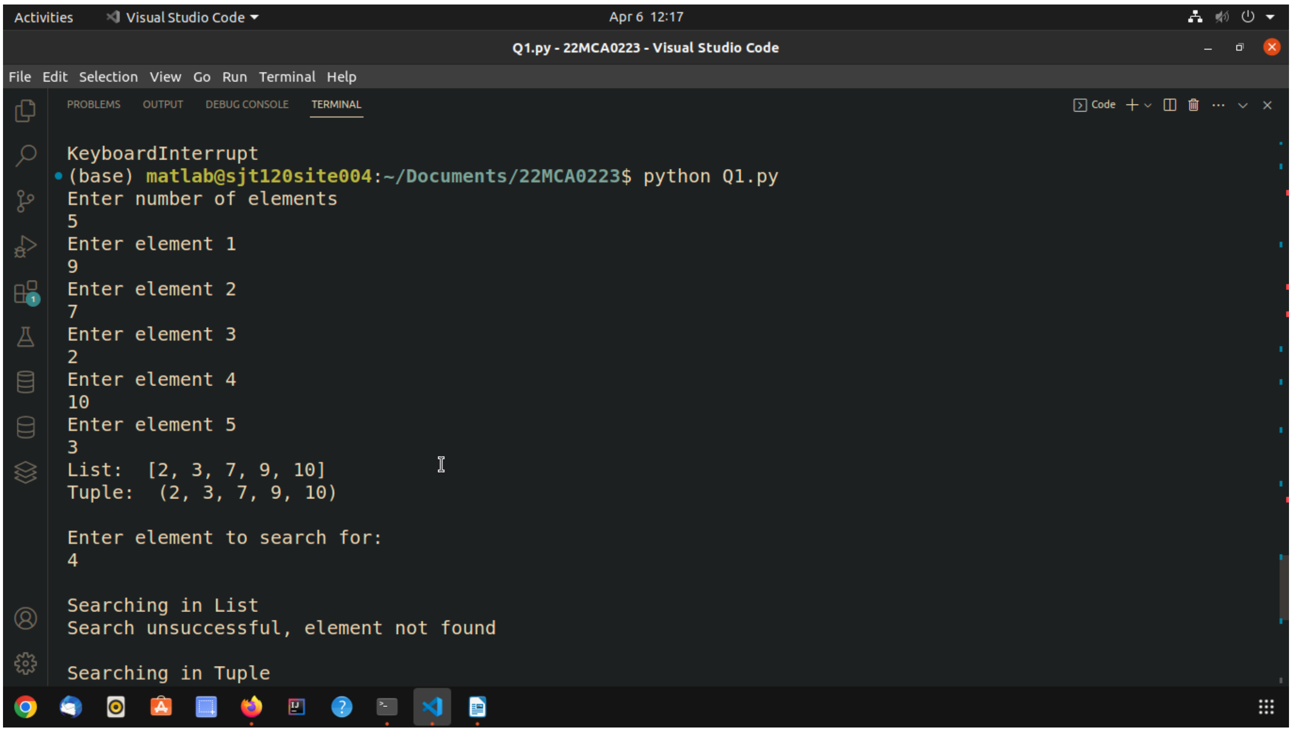
```
# tuple
low = 0
high = len(numbersTuple) - 1
foundIndex = -1

while (low <= high):
    mid = (low + high) // 2

    if numbersTuple[mid] == numberToSearch:
        foundIndex = mid
        break
    elif numbersTuple[mid] < numberToSearch:
        low = mid + 1
    elif numbersTuple[mid] > numberToSearch:
        high = mid - 1

if (foundIndex != -1):
    print("Search successful, element position is found at " + str(foundIndex + 1))
else:
    print("Search unsuccessful, element not found")
```

OUTPUT


Activities
Visual Studio Code
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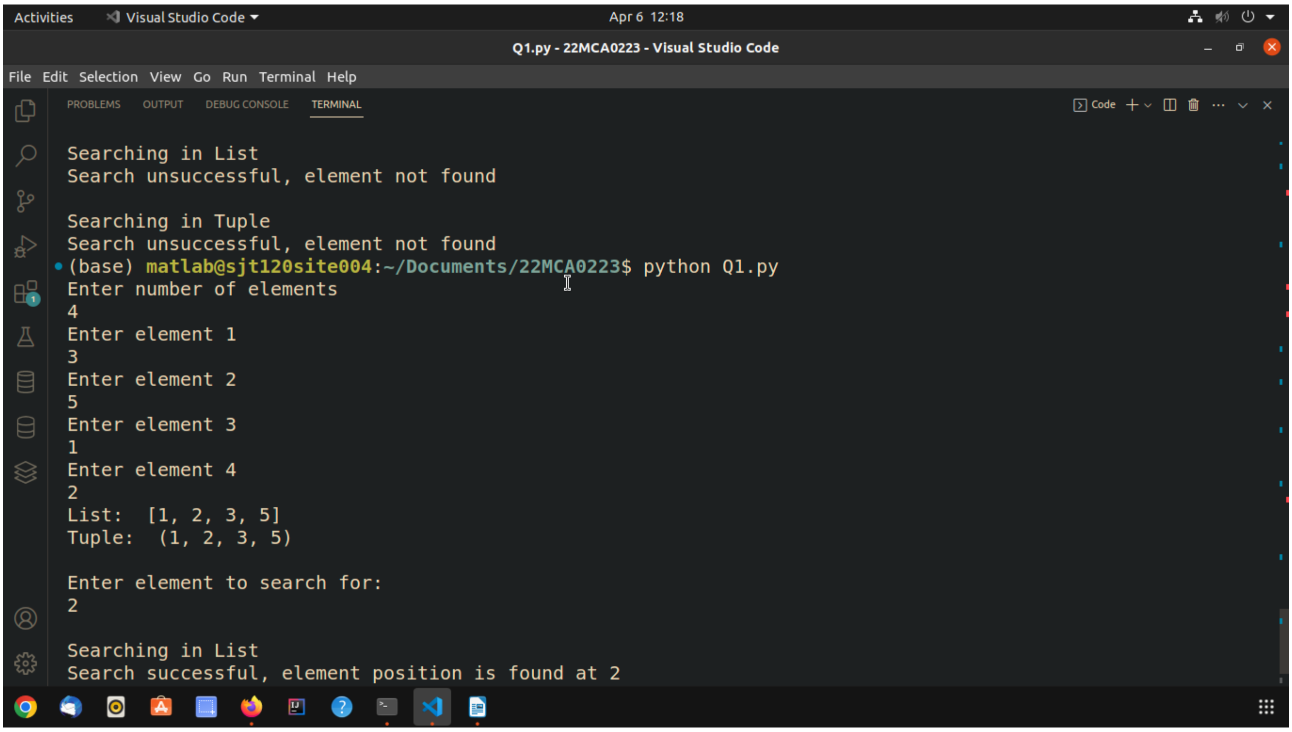
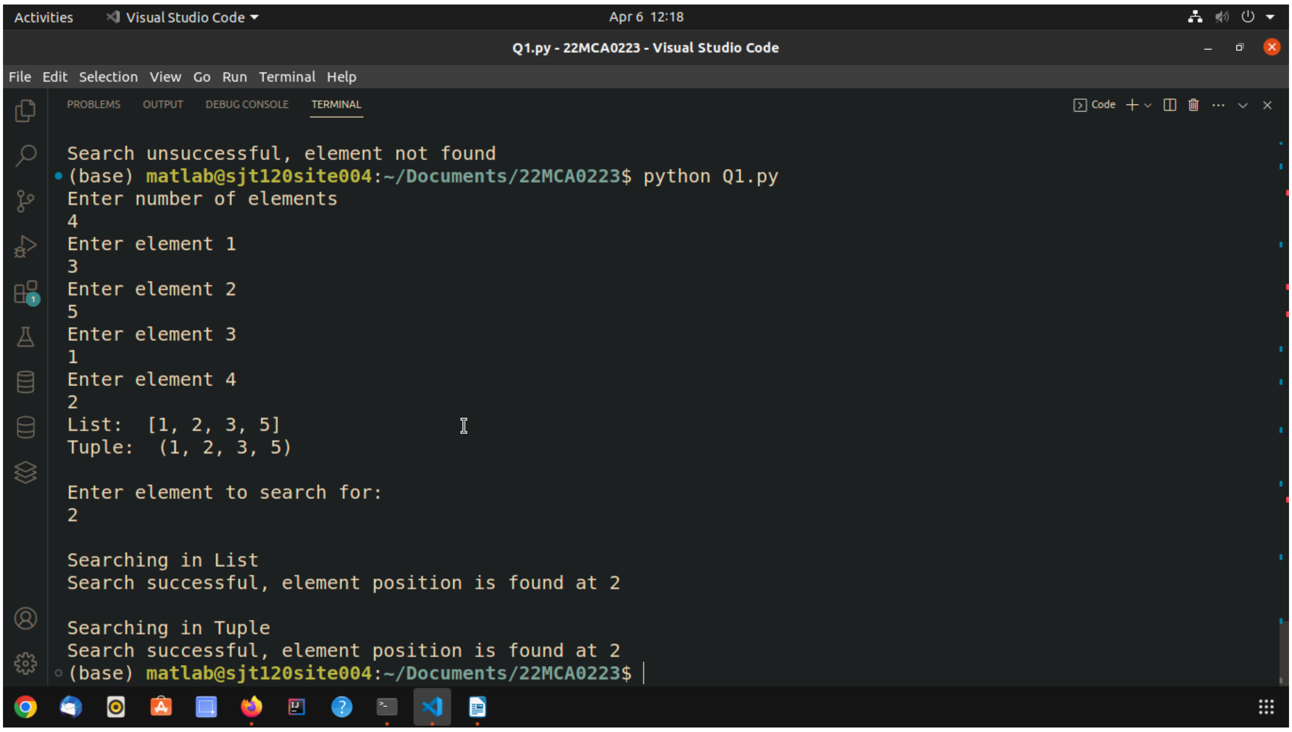
Q1.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Code

```
KeyboardInterrupt
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python Q1.py
Enter number of elements
5
Enter element 1
9
Enter element 2
7
Enter element 3
2
Enter element 4
10
Enter element 5
3
List:  [2, 3, 7, 9, 10]
Tuple:  (2, 3, 7, 9, 10)

Enter element to search for:
4

Searching in List
Search unsuccessful, element not found

Searching in Tuple
```


Activities
Visual Studio Code
Apr 6 12:18
Q1.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Code

```
Searching in List
Search unsuccessful, element not found

Searching in Tuple
Search unsuccessful, element not found
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python Q1.py
Enter number of elements
4
Enter element 1
3
Enter element 2
5
Enter element 3
1
Enter element 4
2
List:  [1, 2, 3, 5]
Tuple:  (1, 2, 3, 5)

Enter element to search for:
2

Searching in List
Search successful, element position is found at 2
```


Activities
Visual Studio Code
Apr 6 12:18
Q1.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code

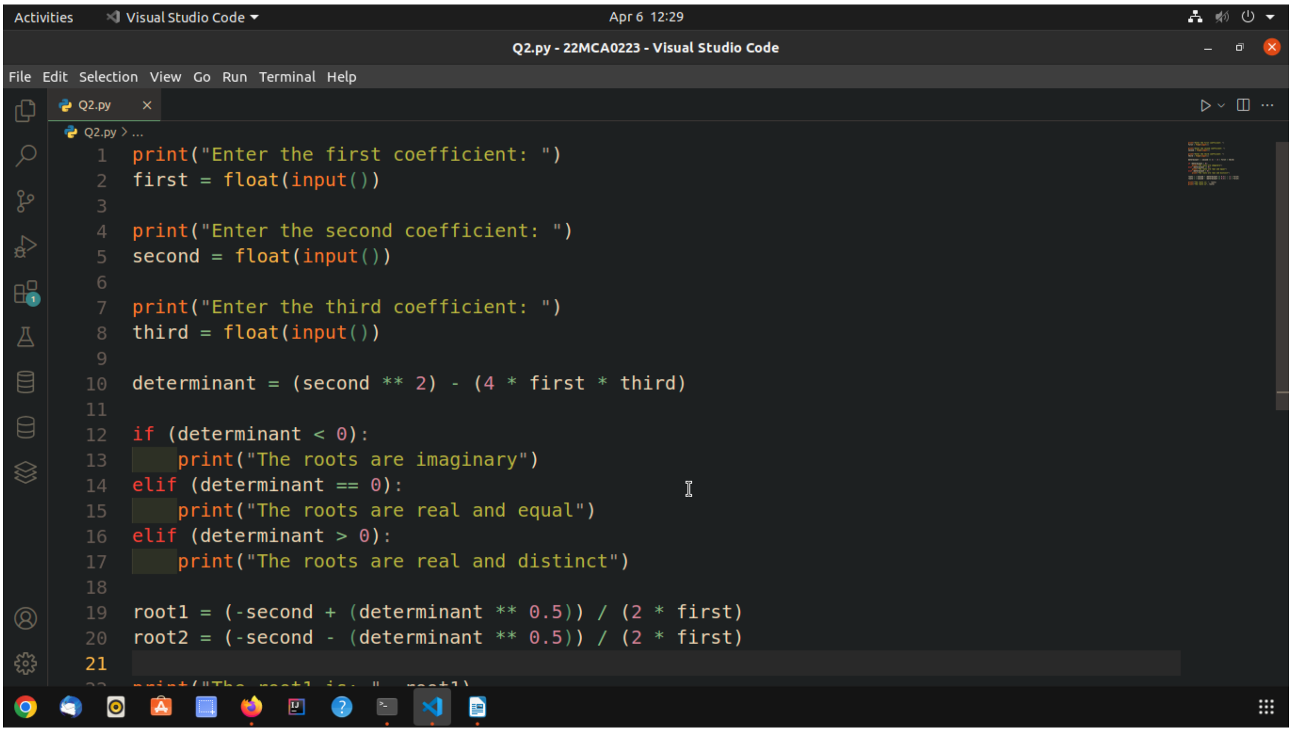
```
Search unsuccessful, element not found
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python Q1.py
Enter number of elements
4
Enter element 1
3
Enter element 2
5
Enter element 3
1
Enter element 4
2
List:  [1, 2, 3, 5]
Tuple:  (1, 2, 3, 5)

Enter element to search for:
2

Searching in List
Search successful, element position is found at 2

Searching in Tuple
Search successful, element position is found at 2
(base) matlab@sjt120site004:~/Documents/22MCA0223$
```

Question 2 (7 Marks)

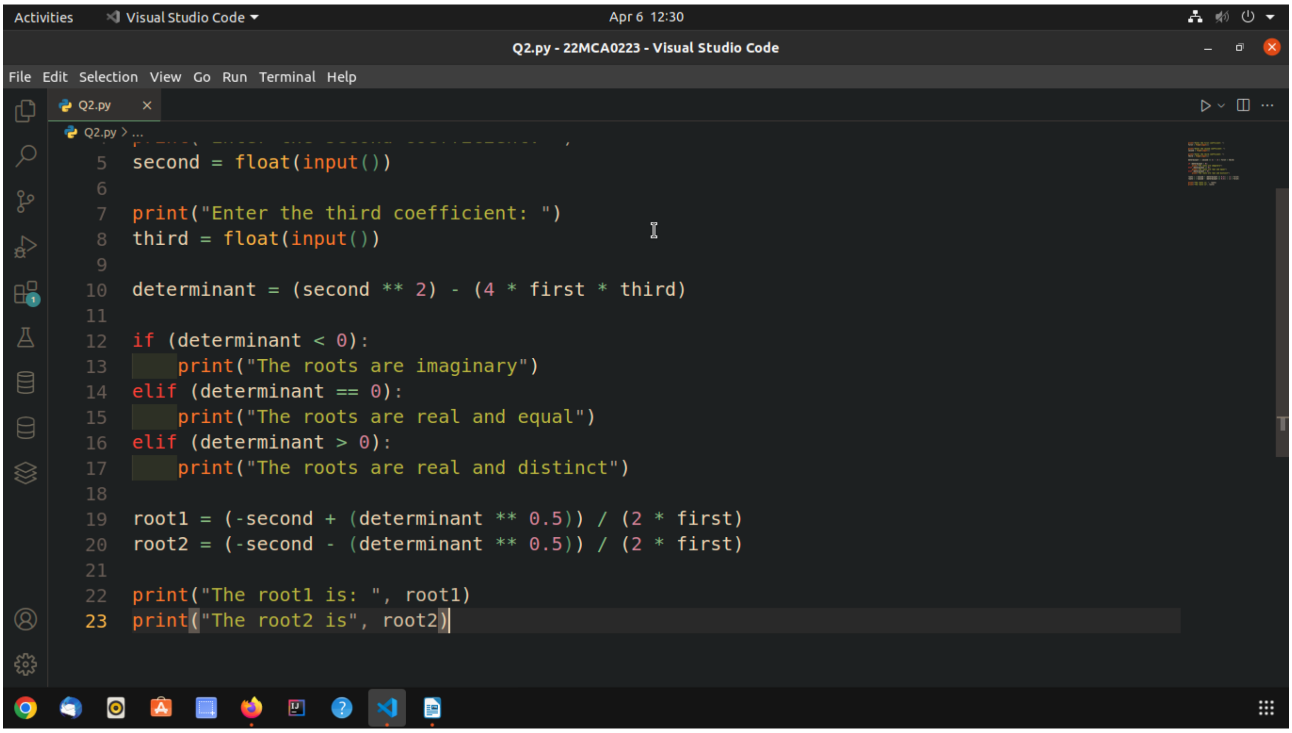
Write a python program to find the roots of a quadratic equation using three coefficients and find whether their roots are real and distinct and fetch the output values.

Output Format:

```
Enter the first coefficient: 4
Enter the second coefficient: 7
Enter the third coefficient: 2
The roots are real and distinct.
The root1 is: -0.3596117967977924
The root2 is: -1.3903882032022077
```

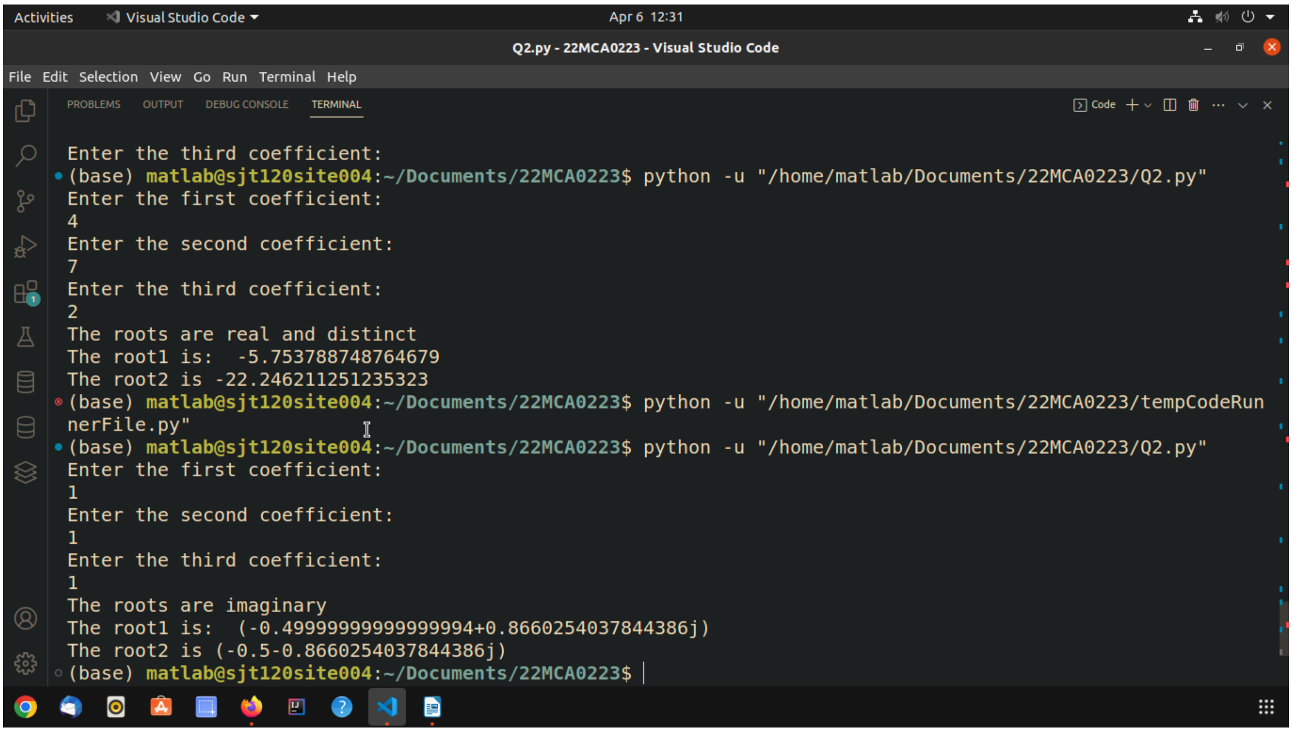

Activities
Visual Studio Code
Apr 6 12:29
Q2.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Q2.py
Q2.py > ...

```python
print("Enter the first coefficient: ")
first = float(input())

print("Enter the second coefficient: ")
second = float(input())

print("Enter the third coefficient: ")
third = float(input())

determinant = (second ** 2) - (4 * first * third)

if (determinant < 0):
    print("The roots are imaginary")
elif (determinant == 0):
    print("The roots are real and equal")
elif (determinant > 0):
    print("The roots are real and distinct")

root1 = (-second + (determinant ** 0.5)) / (2 * first)
root2 = (-second - (determinant ** 0.5)) / (2 * first)

print("The root1 is: ", root1)
```

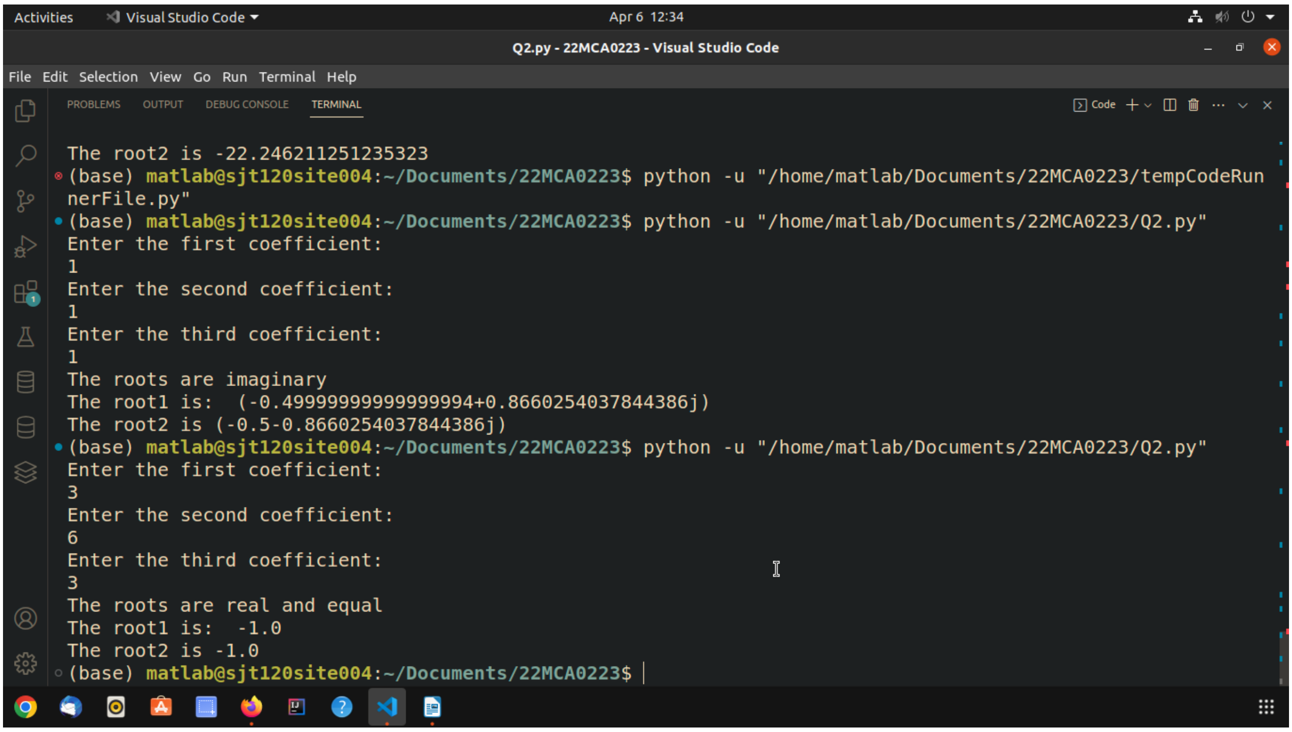

Activities
Visual Studio Code
Apr 6 12:30
Q2.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
Q2.py
Q2.py > ...

```python
print("Enter the second coefficient: ")
second = float(input())

print("Enter the third coefficient: ")
third = float(input())

determinant = (second ** 2) - (4 * first * third)

if (determinant < 0):
    print("The roots are imaginary")
elif (determinant == 0):
    print("The roots are real and equal")
elif (determinant > 0):
    print("The roots are real and distinct")

root1 = (-second + (determinant ** 0.5)) / (2 * first)
root2 = (-second - (determinant ** 0.5)) / (2 * first)

print("The root1 is: ", root1)
print("The root2 is", root2)
```

OUTPUT


Activities
Visual Studio Code
Apr 6 12:31
Q2.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Code

```
Enter the third coefficient:
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python -u "/home/matlab/Documents/22MCA0223/Q2.py"
Enter the first coefficient:
4
Enter the second coefficient:
7
Enter the third coefficient:
2
The roots are real and distinct
The root1 is:  -5.753788748764679
The root2 is -22.246211251235323
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python -u "/home/matlab/Documents/22MCA0223/tempCodeRun
nerFile.py"
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python -u "/home/matlab/Documents/22MCA0223/Q2.py"
Enter the first coefficient:
1
Enter the second coefficient:
1
Enter the third coefficient:
1
The roots are imaginary
The root1 is:  (-0.49999999999999994+0.8660254037844386j)
The root2 is (-0.5-0.8660254037844386j)
(base) matlab@sjt120site004:~/Documents/22MCA0223$ 
```


Activities
Visual Studio Code
Apr 6 12:34
Q2.py - 22MCA0223 - Visual Studio Code
File Edit Selection View Go Run Terminal Help
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Code

```
The root2 is -22.246211251235323
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python -u "/home/matlab/Documents/22MCA0223/tempCodeRun
nerFile.py"
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python -u "/home/matlab/Documents/22MCA0223/Q2.py"
Enter the first coefficient:
1
Enter the second coefficient:
1
Enter the third coefficient:
1
The roots are imaginary
The root1 is:  (-0.49999999999999994+0.8660254037844386j)
The root2 is (-0.5-0.8660254037844386j)
(base) matlab@sjt120site004:~/Documents/22MCA0223$ python -u "/home/matlab/Documents/22MCA0223/Q2.py"
Enter the first coefficient:
3
Enter the second coefficient:
6
Enter the third coefficient:
3
The roots are real and equal
The root1 is:  -1.0
The root2 is -1.0
(base) matlab@sjt120site004:~/Documents/22MCA0223$ 
```