

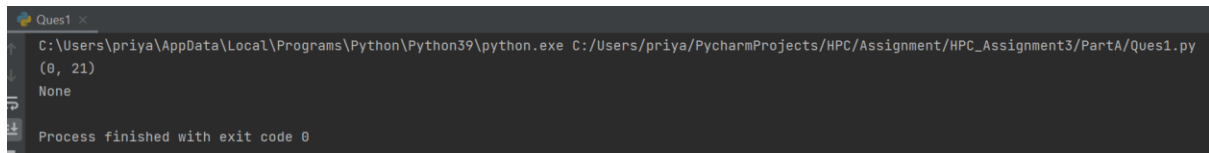
## **PART-A**

### **Question 1-**

#### **CODE:**

<https://github.com/priyanshurawat1509/Homework3/blob/0cd6bf08e7638a5fa257d2c3f6c3368343fc49af/Ques1.py>

#### **OUTPUT:**



```
Ques1
C:\Users\priya\AppData\Local\Programs\Python\Python39\python.exe C:/Users/priya/PycharmProjects/HPC/Assignment/HPC_Assignment3/PartA/Ques1.py
(0, 21)
None
Process finished with exit code 0
```

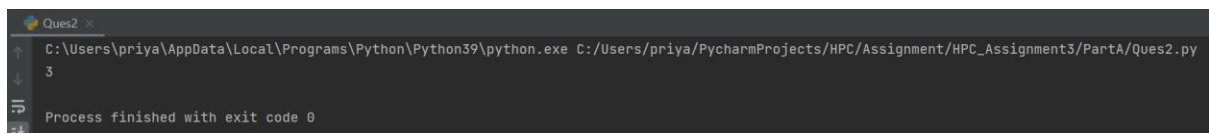
Since we are iterating the given array only once, the time complexity of the program comes out to be  $O(n)$ .

### **Question 2-**

#### **CODE:**

<https://github.com/priyanshurawat1509/Homework3/blob/1655c7067b583db7f43087c5da3a179d6c88d2ff/Ques2.py>

#### **OUTPUT:**



```
Ques2
C:\Users\priya\AppData\Local\Programs\Python\Python39\python.exe C:/Users/priya/PycharmProjects/HPC/Assignment/HPC_Assignment3/PartA/Ques2.py
3
Process finished with exit code 0
```

### **Question 3-**

#### **CODE:**

<https://github.com/priyanshurawat1509/Homework3/blob/1655c7067b583db7f43087c5da3a179d6c88d2ff/Ques3.py>

#### **OUTPUT:**

For Input: (2 -> 4 -> 3) + (5 -> 6 -> 4)

Output: 7 -> 0 -> 8

### **Question 4-**

#### **CODE:**

<https://github.com/priyanshurawat1509/Homework3/blob/1655c7067b583db7f43087c5da3a179d6c88d2ff/Ques4.py>

#### **OUTPUT:**

For s = "abcabcbb" ; The answer is "abc", with the length of 3.

```
Ques4 x
C:\Users\priya\AppData\Local\Programs\Python\Python39\python.exe C:/Users/priya/PycharmProjects/HPC/Assignment/HPC_Assignment3/PartA/Ques4.py
3
Process finished with exit code 0
```

## Question 5-

### CODE:

<https://github.com/priyanshurawat1509/Homework3/blob/1655c7067b583db7f43087c5da3a179d6c88d2ff/Ques5.py>

### OUTPUT:

```
Ques5 x
C:\Users\priya\AppData\Local\Programs\Python\Python39\python.exe C:/Users/priya/PycharmProjects/HPC/Assignment/HPC_Assignment3/PartA/Ques5.py
a = [4 3 2 1]
b = [2 3 4 1]
Addition= [6 6 6 2]
Division = [2.  1.  0.5 1. ]
Subtraction = [ 2  0 -2  0]
Multiplication = [8 9 8 1]
a =
[[1 8 6 7]
 [1 3 9 6]
 [6 8 4 4]
 [8 4 5 6]]
b =
[[8 4 9 6]
 [7 4 2 6]
 [6 9 5 6]
 [5 8 3 4]]
Addition=
[[ 9 12 15 13]
 [ 8  7 11 12]
 [12 17  9 10]
 [13 12  8 10]]
Division =
[[0.125      2.      0.66666667 1.16666667]
 [0.14285714 0.75    4.5      1.      ]
 [1.      0.88888889 0.8      0.66666667]
 [1.6      0.5      1.66666667 1.5      ]]
Subtraction =
[[-7  4 -3  1]
 [-6 -1  7  0]
 [ 0 -1 -1 -2]
 [ 3 -4  2  2]]
Multiplication =
[[ 8 32 54 42]
 [ 7 12 18 36]
 [36 72 20 24]
 [40 32 15 24]]
Process finished with exit code 0
```

## Question 6-

### CODE:

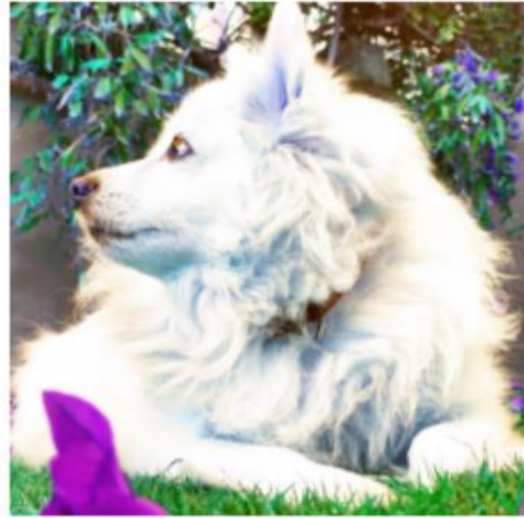
<https://github.com/priyanshurawat1509/Homework3/blob/1655c7067b583db7f43087c5da3a179d6c88d2ff/Ques6.py>

### OUTPUT:

Before



After using bilateral filter



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### Question 7-

#### CODE:

<https://github.com/priyanshurawat1509/Homework3/blob/0e233704c5504a7a23143e65f28bdbef62241825/Ques7.py>

#### OUTPUT:

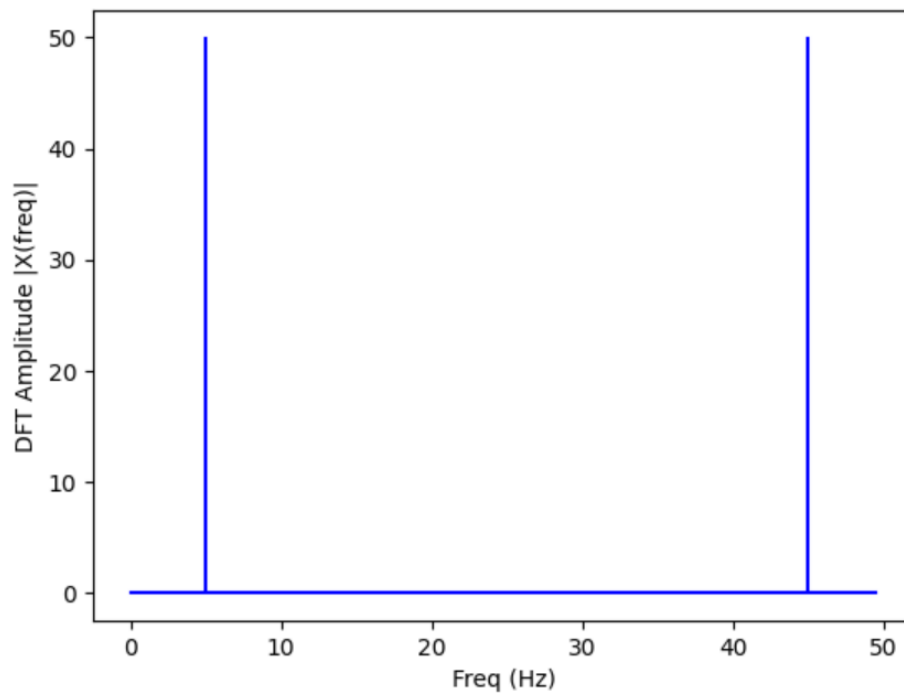
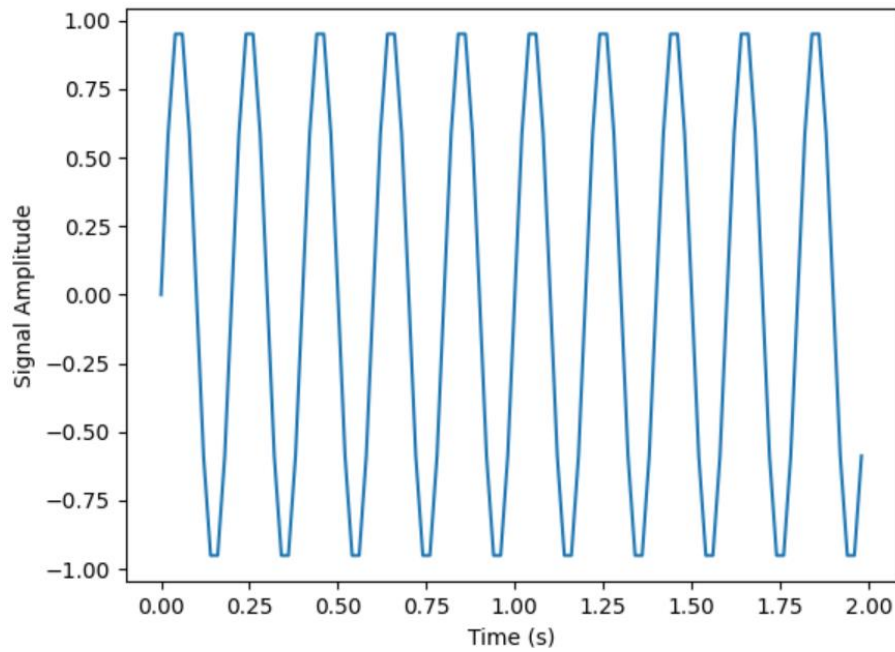
```
Ques7 (1) x
C:\Users\priya\AppData\Local\Programs\Python\Python39\python.exe C:/Users/priya/PycharmProjects/HPC/Assignment/HPC_Assignment3/PartA/Ques7.py
True
Process finished with exit code 0
```

### Question 8-

#### CODE:

<https://github.com/priyanshurawat1509/Homework3/blob/b61aa0e0d8e579c54c9dd7670df4f9da96ffa3b5/Ques8.py>

#### OUTPUT:



### Extra Question 1-

#### CODE:

<https://github.com/priyanshurawat1509/Homework3/blob/1655c7067b583db7f43087c5da3a179d6c88d2ff/ExtraQues1.py>

#### OUTPUT:

```
ExtraQues1 x
C:\Users\priya\AppData\Local\Programs\Python\Python39\python.exe C:/Users/priya/PycharmProjects/HPC/Assignment/HPC_Assignment3/PartA/ExtraQues1.py
6
Process finished with exit code 0
```

### Extra Question 3-

#### CODE:

<https://github.com/priyanshurawat1509/Homework3/blob/1655c7067b583db7f43087c5da3a179d6c88d2ff/ExtraQues3.py>

#### OUTPUT:

```
ExtraQues3
C:\Users\priya\AppData\Local\Programs\Python\Python39\python.exe C:/Users/priya/PycharmProjects/HPC/Assignment/HPC_Assignment3/PartA/ExtraQues3.py
Original array:
[[ 0 10 20]
 [20 30 40]]
Values bigger than 10 = [20 20 30 40]
The indices of these values are = (array([0, 1, 1, 1], dtype=int64), array([2, 0, 1, 2], dtype=int64))
Process finished with exit code 0
```

### Extra Question 4-

#### CODE:

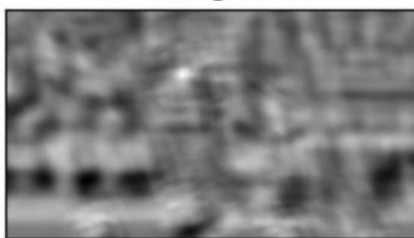
<https://github.com/priyanshurawat1509/Homework3/blob/0cd6bf08e7638a5fa257d2c3f6c3368343fc49af/ExtraQues4.py>

#### OUTPUT:

---

cv2.TM\_CCOEFF

Matching Result



Detected Point



cv2.TM\_CCOEFF\_NORMED

Matching Result



Detected Point



cv2.TM\_CCORR

Matching Result



Detected Point



cv2.TM\_CCORR\_NORMED

Matching Result

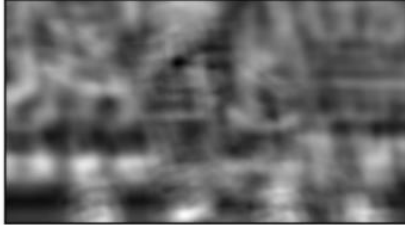


Detected Point



cv2.TM\_SQDIFF

Matching Result



Detected Point



cv2.TM\_SQDIFF\_NORMED

Matching Result



Detected Point



## PART-B

***Ques 1 &2 - Attached In ZIP Files***