Exercise 3

Task-1

```python
import timeit
# custom search
def custom_search(arr, x):
    for i in range(len(arr)):
        if arr[i] == x:
            return i
    return -1
# input array
arr = list(map(int, input("Enter numbers separated by space: ").split()))
x = int(input("Enter number to search: "))
# results
print("Custom search result:", custom_search(arr, x))
print("Built-in search result:", arr.index(x) if x in arr else -1)
# timings
print("Custom search time:", timeit.timeit("custom_search(arr, x)", globals=globals(), number=
print("Built-in search time:", timeit.timeit("arr.index(x)", globals=globals(), number=1000))

```

```
PS C:\Users\NB\Desktop\LabCIS\DSATsks> python -u "c:\Users\NB\Desktop\LabCIS\DSATsks\lab3\task1.py"
Enter numbers separated by space: 5 5 6 8 9 10
Enter number to search: 6
Custom search result: 2
Built-in search result: 2
Custom search time: 0.00043919996824115515
Built-in search time: 0.00010579999070614576
PS C:\Users\NB\Desktop\LabCIS\DSATsks>
```

Task-2

```python
def take_input():
    arr = list(map(int, input("Enter sorted numbers separated by space: ").split()))
    # check if sorted
    if arr != sorted(arr):
        print("Warning: Data is not sorted!")
    return arr

def binary_search_insert(arr, x):
    low, high = 0, len(arr) - 1
    while low <= high:
        mid = (low + high) // 2
        if arr[mid] == x:
            return mid, arr  # found
        elif arr[mid] < x:
            low = mid + 1
        else:
            high = mid - 1
    arr.insert(low, x)
    return -1, arr


arr = take_input()
x = int(input("Enter number to search: "))
pos, arr = binary_search_insert(arr, x)
```

```
PS C:\Users\NB\Desktop\LabCIS\DSATsks> python -u "c:\Users\NB\Desktop\LabCIS\DSATsks\lab3\task2.py"
Enter sorted numbers separated by space: 5 6 7 9 10 22 36
Enter number to search: 36
Element found at index 6
PS C:\Users\NB\Desktop\LabCIS\DSATsks> python -u "c:\Users\NB\Desktop\LabCIS\DSATsks\lab3\task2.py"
Enter sorted numbers separated by space: 5 9 88 56 55 47 66
Warning: Data is not sorted!
Enter number to search: 4
Element not found. Inserted into array.
Updated array: [4, 5, 9, 88, 56, 55, 47, 66]
PS C:\Users\NB\Desktop\LabCIS\DSATsks>
```

```
PS C:\Users\NB\Desktop\LabCIS\DSATsks> python -u "c:\Users\NB\Desktop\LabCIS\DSATsks\lab4\task3.py"
Resultant Matrix C:
[58, 64]
[139, 154]
PS C:\Users\NB\Desktop\LabCIS\DSATsks>
```