Assignment (Search/Sort)

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Q.1 Write python programs to perform sorting of numbers in ascending order:

a) Selection Sort

```
def selection_sort(array):
    size = len(array)
    for i in range(size-1):
        min = i
        for j in range(i+1, size):
            if (array[j]<array[min]):
                min = j

        if (min != i):
            tmp = array[i]
            array[i] = array[min]
            array[min] = tmp
    return array


def main():
    l = [20,11,3,1]
    print(l)
    l = selection_sort(l)
    print(l)

if __name__ == "__main__":
    main()
```

```
[20, 11, 3, 1]
[1, 3, 11, 20]
```

b) Insertion Sort

```
def insertion_sort(array):
    for i in range(len(array)):
        tmp = array[i]
        j = i-1
        while (j>=0 and array[j]>tmp):
            array[j+1] = array[j]
            j -= 1
        array[j+1] = tmp
    return array

def main():
    l = [2,1,4,5]
    print(l)
    l = insertion_sort(l)
    print(l)
if __name__ == "__main__":
    main()
```

```
[2, 1, 4, 5]
[1, 2, 4, 5]
```

Q.2 Write python programs to perform the searching using following methods:

a) Linear Search

```
def linear_search(element, array):
    for i in array:
        if i == element:
            return array.index(i)
    return -1

    # One liner code:
    # return ([array.index(x) for x in array if x == element]+[-1])[0]

def main():
    l = [1,2,3,4,5]
    print(linear_search(2,l))
    print(linear_search(6,l))


if __name__ == "__main__":
    main()
```

```
1
-1
```

b) Binary search

```
def binary_search(element, array):
    low = 0
    high = len(array)-1
    while(low<=high):
        mid = (high+low)//2
        if array[mid] == element:
            return mid
        elif array[mid] > element:
            high = mid-1
        else:
            low = mid+1
    return -1

def main():
    l = [1,2,3,4,5]
    print(binary_search(5,l))
    print(binary_search(8,l))

if __name__ == "__main__":
    main()
```

```
4
-1
```