```python
import random

# 14-1
def LinearSearch(arr, target):  1 usage  new *
    for i in range(len(arr)):
        if arr[i] == target:
            return i
    return -1

A = [random.randint( a: 1,  b: 100) for i in range(50)]
print(A)
key = eval(input("Please input your key(1~100): "))

index = LinearSearch(A, key)
if index == -1:
    print("The key not found")
else:
    print("The key is valid, found key at index ", index)

# 14-2
def BinarySearch(arr, low, high, key):  3 usages  new *
    mid = low + (high - low)//2
    if low > high:
        return -1
    if arr[mid] == key:
        return mid
    elif arr[mid] > key:
        return BinarySearch(arr, low, mid - 1, key)
    else:
        return BinarySearch(arr, mid + 1, high, key)

A = [random.randint( a: 1,  b: 100) for i in range(50)]
A.sort()
print(A)
```

```python
print(A)
key = eval(input("Please input your key(1~100): "))

index = BinarySearch(A, low: 0, len(A) - 1 , key)
if index == -1:
    print("The key not found")
else:
    print("The key is valid, found key at index ", index)

# 14-3
def Bubble_Sort(A):  2 usages  new *
    for i in range(len(A)):
        for j in range(len(A) - i - 1):
            if A[j] > A[j + 1]:
                temp = A[j]
                A[j] = A[j + 1]
                A[j + 1] = temp

A = [random.randint( a: 1,  b: 100) for i in range(5)]
print("Before sort: ", end = "")
print(A)
print("After sort: ", end = "")
Bubble_Sort(A)
print(A)

# 14-4
B = [i for i in range(1, 101)]
random.shuffle(B)
print("Before sort: ", end = "")
print(B)
print("After sort: ", end = "")
Bubble_Sort(B)
print(B)
```

```
print(B)
print("After sort: ", end = "")
Bubble_Sort(B)
print(B)

# 14-5
def Insertion_Sort(A):  2 usages  new *
    for i in range(1, len(A)):
        j = i - 1
        key = A[i]
        while j >= 0 and key < A[j]:
            A[j + 1] = A[j]
            j -= 1
        A[j + 1] = key

A = [random.randint( a: 1,  b: 100) for i in range(5)]
print("Before sort: ", end = "")
print(A)
print("After sort: ", end = "")
Insertion_Sort(A)
print(A)

# 14-6
B = [i for i in range(1, 101)]
random.shuffle(B)
print("Before sort: ", end = "")
print(B)
print("After sort: ", end = "")
Insertion_Sort(B)
print(B)
```

```
/usr/local/bin/python3.12 /Users/pengyenjia/Desktop/運算思維與程式設計/makeUp_Submission_py/6_3/課堂練習/11227130_資訊二甲_11227130_彭妍嘉 6_3.py
[49, 89, 27, 6, 56, 31, 54, 22, 41, 73, 41, 44, 21, 91, 18, 49, 81, 22, 24, 54, 1, 3, 66, 7, 10, 4, 34, 95, 55, 79, 77, 55, 72, 25, 70, 50, 69, 100, 67, 100, 41, 56, 1
Please input your key(1~100): 49
The key is valid, found key at index  0
[1, 3, 4, 6, 8, 10, 14, 16, 18, 19, 20, 21, 24, 29, 31, 34, 34, 37, 38, 39, 40, 43, 47, 52, 59, 61, 65, 67, 68, 76, 80, 81, 82, 83, 83, 85, 87, 87, 88, 89, 90, 91, 91,
Please input your key(1~100): 1
The key is valid, found key at index  0
Before sort: [94, 92, 44, 52, 57]
After sort: [44, 52, 57, 92, 94]
Before sort: [62, 85, 97, 31, 75, 21, 100, 49, 67, 96, 35, 4, 5, 1, 46, 59, 6, 58, 23, 76, 9, 71, 36, 94, 69, 55, 19, 65, 40, 28, 45, 77, 32, 50, 90, 73, 14, 74, 63, 8
After sort: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41,
Before sort: [58, 16, 74, 16, 82]
After sort: [16, 16, 58, 74, 82]
Before sort: [24, 99, 5, 45, 85, 62, 27, 10, 83, 8, 19, 72, 73, 80, 77, 70, 51, 84, 68, 90, 92, 36, 54, 50, 82, 86, 89, 71, 40, 38, 20, 76, 41, 61, 88, 93, 63, 26, 17,
After sort: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41,

Process finished with exit code 0
```