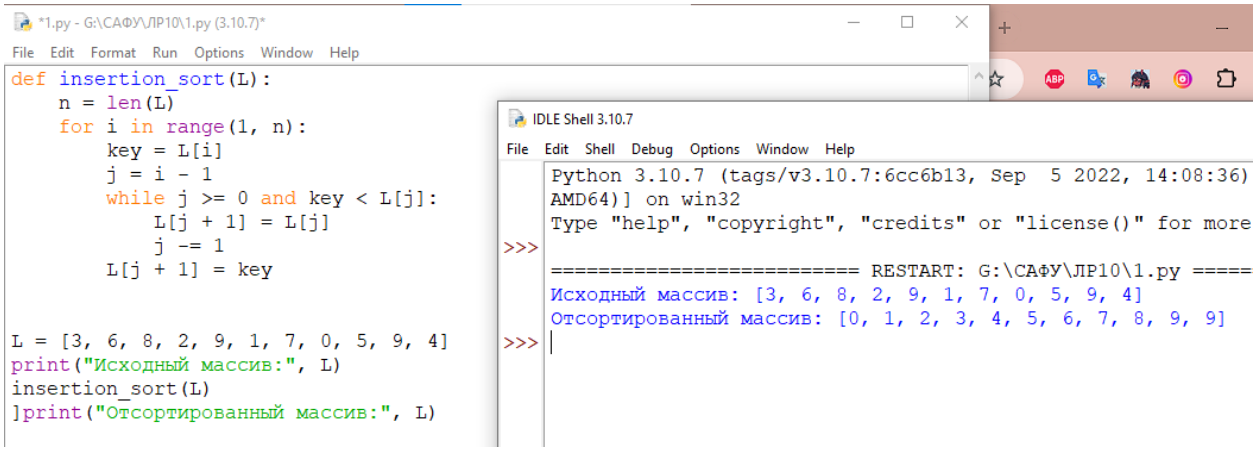
1 задание

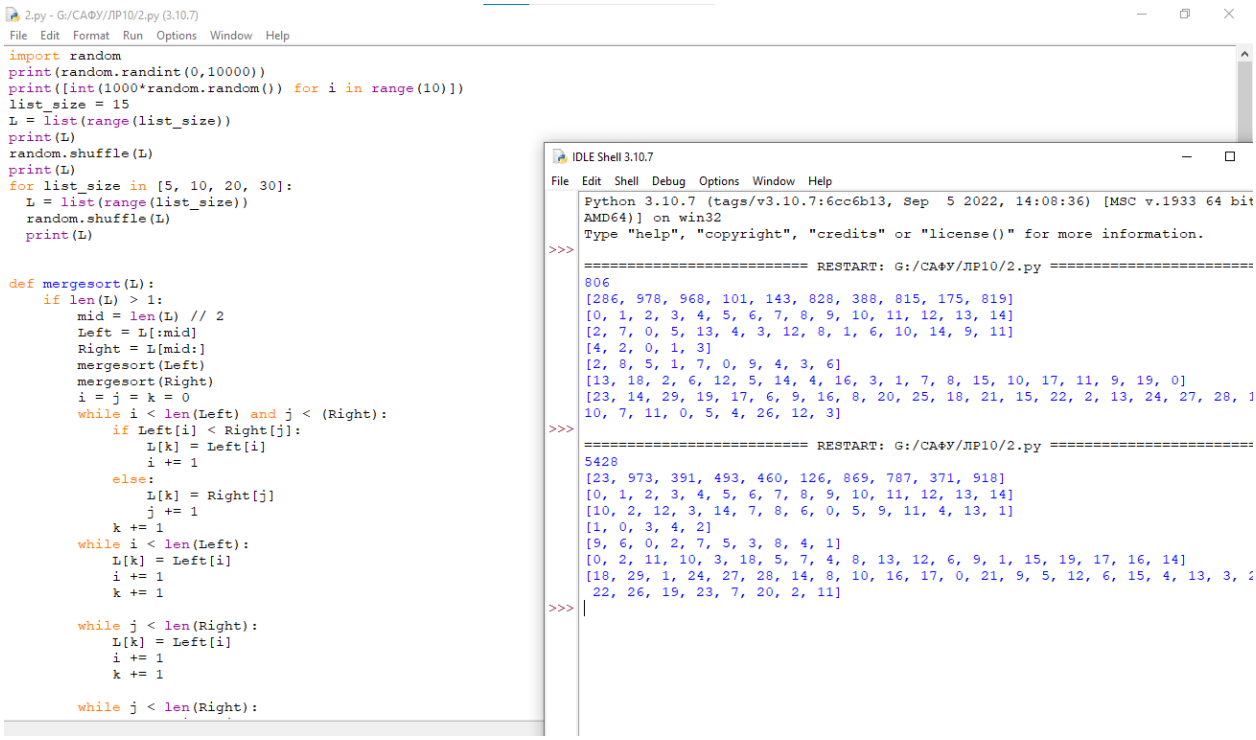


```
*1.py - G:\САФУ\ЛР10\1.py (3.10.7)*
File  Edit  Format  Run  Options  Window  Help
def insertion_sort(L):
    n = len(L)
    for i in range(1, n):
        key = L[i]
        j = i - 1
        while j >= 0 and key < L[j]:
            L[j + 1] = L[j]
            j -= 1
        L[j + 1] = key


L = [3, 6, 8, 2, 9, 1, 7, 0, 5, 9, 4]
print("Исходный массив:", L)
insertion_sort(L)
]print("Отсортированный массив:", L)
```

```
IDLE Shell 3.10.7
File  Edit  Shell  Debug  Options  Window  Help
Python 3.10.7 (tags/v3.10.7:6cc6b13, Sep  5 2022, 14:08:36)
AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more
>>>
========== RESTART: G:\САФУ\ЛР10\1.py =====
Исходный массив: [3, 6, 8, 2, 9, 1, 7, 0, 5, 9, 4]
Отсортированный массив: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 9]
>>>
```

2-3 задание



```
2.py - G:/САФУ/ЛР10/2.py (3.10.7)
File  Edit  Format  Run  Options  Window  Help
import random
print(random.randint(0,10000))
print([int(1000*random.random()) for i in range(10)])
list_size = 15
L = list(range(list_size))
print(L)
random.shuffle(L)
print(L)
for list_size in [5, 10, 20, 30]:
  L = list(range(list_size))
  random.shuffle(L)
  print(L)


def mergesort(L):
    if len(L) > 1:
        mid = len(L) // 2
        Left = L[:mid]
        Right = L[mid:]
        mergesort(Left)
        mergesort(Right)
        i = j = k = 0
        while i < len(Left) and j < (Right):
            if Left[i] < Right[j]:
                L[k] = Left[i]
                i += 1
            else:
                L[k] = Right[j]
                j += 1
            k += 1
        while i < len(Left):
            L[k] = Left[i]
            i += 1
            k += 1

        while j < len(Right):
            L[k] = Left[i]
            i += 1
            k += 1

        while j < len(Right):
```

```
IDLE Shell 3.10.7
File  Edit  Shell  Debug  Options  Window  Help
Python 3.10.7 (tags/v3.10.7:6cc6b13, Sep  5 2022, 14:08:36) [MSC v.1933 64 bit
AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: G:/САФУ/ЛР10/2.py ==========
806
[286, 978, 968, 101, 143, 828, 388, 815, 175, 819]
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]
[2, 7, 0, 5, 13, 4, 3, 12, 8, 1, 6, 10, 14, 9, 11]
[4, 2, 0, 1, 3]
[2, 8, 5, 1, 7, 0, 9, 4, 3, 6]
[13, 18, 2, 6, 12, 5, 14, 4, 16, 3, 1, 7, 8, 15, 10, 17, 11, 9, 19, 0]
[23, 14, 29, 19, 17, 6, 9, 16, 8, 20, 25, 18, 21, 15, 22, 2, 13, 24, 27, 28, 1
10, 7, 11, 0, 5, 4, 26, 12, 3]
>>>
========== RESTART: G:/САФУ/ЛР10/2.py ==========
5428
[23, 973, 391, 493, 460, 126, 869, 787, 371, 918]
[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]
[10, 2, 12, 3, 14, 7, 8, 6, 0, 5, 9, 11, 4, 13, 1]
[1, 0, 3, 4, 2]
[9, 6, 0, 2, 7, 5, 3, 8, 4, 1]
[0, 2, 11, 10, 3, 18, 5, 7, 4, 8, 13, 12, 6, 9, 1, 15, 19, 17, 16, 14]
[18, 29, 1, 24, 27, 28, 14, 8, 10, 16, 17, 0, 21, 9, 5, 12, 6, 15, 4, 13, 3, 2
 22, 26, 19, 23, 7, 20, 2, 11]
>>>
```

4 задание

```
L1 = [3,7,8,2,9,1,7,0,5,9,4]
L2 = [3,6,8,2,9,1,7,0,5,9,4]
assert insertionsort(L1) == mergesort(L2)
```

5 задание

Размер данных	Сортировка вставками	Сортировка слиянием
10	0.0	0.0
1000	120.1	0.3
2000	472.3	0.6
3000	1048.9	1.1
4000	1942.0	1.4
5000	2956.3	1.8
10000	12056.4	3.9