

Some examples

n ^a 4 5 2 1 3 9 7 8
• 1 2 3 4 5 6 7

→ ^a 1 2 3 4 5 7 8 9

Sort statement

```
sort.py - C:/Documents and Settings/admin/Desktop/intro-python/examples/17-2/sort.py (3.4.4)
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a=[]
n=int(input("Enter the number of elements: "))
print("enter the data:", end='')
a=list(map(int,input().strip().split(" ")))
a.sort()
print("The sorted array is: ", a)
```

Abominable sort

$O(n^3)$

$n < 8$

t i, j

 5 1 2

absort.py - C:/Documents and Settings/admin/Desktop/intro-python/examples/17-2/absort.py (3.4.4)

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```
def swap(a, i, j):
    t=a[i]
    a[i]=a[j]
    a[j]=t
    return
```

```
def abominable(a):
    i=0
    while ( i < len(a)-1):
        if(a[i] > a[i+1]):
            swap (a, i, i+1)
            i=-1
        i=i+1
    return
```

```
a=[]
n=int(input("Enter the number of elements: "))
print("enter the data:", end='')
a=list(map(int,input().strip().split(" ")))
abominable(a)
print("The sorted array is: ", a)
```

$a \rightarrow$

0	1	2	3	4	5	6	7
4	5	2	1	3	9	7	8

4 2 5
 2 4 5 1 3 9 7 8
 2 1 5
 2 1 4 5 3 9 7 8
 1 2 4 5 9 7 8
 1 2 4 5
 1 2 3 4 5 9 7 8
 1 2 3 4 5 7 9 8
 1 2 3 4 5 7 8 9

	i	
0	0	1
1	1	0
2	1	2
3	1	2
4	1	2
5	1	2
6	1	2
7	1	2
8	1	2
9	1	2
10	1	2
11	1	2
12	1	2
13	1	2
14	1	2
15	1	2
16	1	2
17	1	2
18	1	2
19	1	2
20	1	2
21	1	2
22	1	2
23	1	2
24	1	2
25	1	2
26	1	2
27	1	2
28	1	2
29	1	2
30	1	2
31	1	2
32	1	2
33	1	2
34	1	2
35	1	2
36	1	2
37	1	2
38	1	2
39	1	2
40	1	2
41	1	2
42	1	2
43	1	2
44	1	2
45	1	2
46	1	2
47	1	2
48	1	2
49	1	2
50	1	2
51	1	2
52	1	2
53	1	2
54	1	2
55	1	2
56	1	2
57	1	2
58	1	2
59	1	2
60	1	2
61	1	2
62	1	2
63	1	2
64	1	2
65	1	2
66	1	2
67	1	2
68	1	2
69	1	2
70	1	2
71	1	2
72	1	2
73	1	2
74	1	2
75	1	2
76	1	2
77	1	2
78	1	2
79	1	2
80	1	2
81	1	2
82	1	2
83	1	2
84	1	2
85	1	2
86	1	2
87	1	2
88	1	2
89	1	2
90	1	2
91	1	2
92	1	2
93	1	2
94	1	2
95	1	2
96	1	2
97	1	2
98	1	2
99	1	2

Exchange sort

exchangt.py - C:/Documents and Settings/admin/Desktop/intro-python/examples/17-2/exchangt.py (3.4.4)

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```
def swap(a, i, j):
    t=a[i]
    a[i]=a[j]
    a[j]=t
    return
```

```
def exchange(a):
    for i in range(len(a)-1):
        for j in range(i+1, len(a)):
            if(a[i] > a[j]):
                swap(a, i, j)
    return
```

```
a=[]
n=int(input("Enter the number of elements: "))
print("enter the data: ", end='')
a=list(map(int,input().strip().split(" ")))
exchange(a)
print("The sorted array is: ", a)
```

$$\begin{aligned}
 & \sum_{i=0}^{n-2} \sum_{j=i+1}^{n-1} 1 = \sum_{i=0}^{n-2} (n-1-i) \\
 & = (n-1) + (n-2) + (n-3) + \dots + 2 + 1 \\
 & = n + (n-1) + (n-2) + \dots + 1 \\
 & = \frac{n(n+1)}{2} \approx \frac{n^2}{2} \\
 & \approx O(n^2)
 \end{aligned}$$

Bubble sort

bubble1.py - C:/Documents and Settings/admin/Desktop/intro-python/examples/17-2/bubble1.py (3.4.4)

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```
def swap(a, i, j):
    t=a[i]
    a[i]=a[j]
    a[j]=t
    return
```

```
def bubble(a):
    for i in range(len(a)-1, 0, -1) :
        for j in range(i) :
            if(a[j] > a[j+1]):
                swap (a, j, j+1)

    return
```

```
a=[]
n=int(input("Enter the number of elements: "))
print("enter the data: ", end='')
a=list(map(int,input().strip().split(" ")))
bubble(a)
print("The sorted array is: ", a)
```

$$\sum_{i=0}^{n-1} \sum_{j=0}^{i-1} 1 = \sum_{i=0}^{n-1} i = n-1 + n-2 + \dots + 1 + 0$$

$$= O(n^2)$$

Bubble sort

bubble2.py - C:/Documents and Settings/admin/Desktop/intro-python/examples/17-2/bubble2.py (3.4.4)

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```
def swap(a, i, j):
    t=a[i]
    a[i]=a[j]
    a[j]=t
    return

def bubble(a):
    for i in range(0, len(a)-1) :
        for j in range(len(a)-i-1) :
            if(a[j] > a[j+1]):
                swap (a, j, j+1)
    return

a=[]
n=int(input("Enter the number of elements: "))
print("enter the data: ", end='')
a=list(map(int,input().strip().split(" ")))
bubble(a)
print("The sorted array is: ", a)
```

Counting sort

coun.py - C:/Documents and Settings/admin/Desktop/intro-python/examples/17-2/coun.py (3.4.4)

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```
def counting_sort(a, c):
    for i in range(len(a)) :
        c[a[i]]=c[a[i]]+1
    k=0
    for i in range(len(c)) :
        for j in range(c[i]) :
            a[k]=i
            k=k+1
    return
```

```
a=[]
n=int(input("Enter the number of elements: "))
m=int(input("Enter the range of elements: "))
print("enter the data: ", end='')
a=list(map(int,input().strip().split(" ")))
c=[0]*(m+1)
counting_sort(a, c)
print("The sorted array is: ", a)
```

a →

0	1	2	3	4	5	6	7	8	9	10	11
4	5	2	1	3	9	7	8	2	5	1	5

n

c →

0	1	2	3	4	5	6	7	8	9
0	2	2	1	1	3	0	1	1	1

m

a →

0	1	2	3	4	5	6	7	8	9	10	11
1	1	2	2	3	4	5	5	5	7	8	9

n