

# Метод пузырька

Сортировка массива

# Алгоритм

1. **for**  $i := 1$  **to**  $m - 1$  **do**
2.     **for**  $j := 1$  **to**  $m - i$  **do**
3.         **if**  $A[j] > A[j + 1]$  **then begin**
4.              $k := A[j];$
5.              $A[j] := A[j + 1];$
6.              $A[j + 1] := k;$
7.         **end;**

1	9	2	4	8	3	5	4	6	10
---	---	---	---	---	---	---	---	---	----

k

j := 1

i=1  
j := 1 to 9

```
if A[1] > A[ 2 ] then
begin
    k := A[ 1 ];
    A[ 1 ] := A[ 2 ];
    A[ 2 ] := k;
```

1	9	2	4	8	3	5	4	6	10
---	---	---	---	---	---	---	---	---	----

k

j :=

2

i=1

j := 1 to 9

if A[ 2 ] > A[ 3 ] then  
begin

k := A[ 2 ];  
A[ 2 ] := A[ 3 ];  
A[ 3 ] := k;

1	2	9	4	8	3	5	4	6	10
---	---	---	---	---	---	---	---	---	----

k

j := 3

i=1

j := 1 to 9

```
if A[ 3 ] > A[ 4 ] then  
begin  
    k := A[ 3 ];  
    A[ 3 ] := A[ 4 ];  
    A[ 4 ] := k;
```

1	2	4	9	8	3	5	4	6	10
---	---	---	---	---	---	---	---	---	----

k

j :=

4

i=1

j := 1 to 9

```
if A[ 4 ] > A[ 5 ] then  
begin  
    k := A[ 4 ];  
    A[ 4 ] := A[ 5 ];  
    A[ 5 ] := k;
```

1	2	4	8	9	3	5	4	6	10
---	---	---	---	---	---	---	---	---	----

k

j := 5

i=1

j := 1 to 9

```
if A[ 5 ] > A[ 6 ] then  
begin  
    k := A[ 5 ];  
    A[ 5 ] := A[ 6 ];  
    A[ 6 ] := k;
```

1	2	4	8	3	9	5	4	6	10
---	---	---	---	---	---	---	---	---	----

k

j :=

i=1  
j := 1 to 9

```
if A[ 6 ] > A[ 7 ] then
begin
    k := A[ 6 ];
    A[ 6 ] := A[ 7 ];
    A[ 7 ] := k;
```

1	2	4	8	3	5	9	4	6	10
---	---	---	---	---	---	---	---	---	----

k

j :=

7

i=1

j := 1 to 9

if A[ 7 ] > A[ 8 ] then  
begin

k := A[ 7 ];  
A[ 7 ] := A[ 8 ];  
A[ 8 ] := k;

1	2	4	8	3	5	4	9	6	10
---	---	---	---	---	---	---	---	---	----

k

j :=

8

i=1

j := 1 to 9

```
if A[ 8 ] > A[ 9 ] then  
begin  
    k := A[ 8 ];  
    A[ 8 ] := A[ 9 ];  
    A[ 9 ] := k;
```

1	2	4	8	3	5	4	6	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

9

i=1

j := 1 to 9

```
if A[ 9 ] > A[ 10 ] then  
begin  
    k := A[ 9 ];  
    A[ 9 ] := A[ 10 ];  
    A[ 10 ] := k;
```

1	2	4	8	3	5	4	6	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

1

i=2

j := 1 to 8

```
if A[ 1 ] > A[ 2 ] then  
begin  
    k := A[ 1 ];  
    A[ 1 ] := A[ 2 ];  
    A[ 2 ] := k;
```

1	2	4	8	3	5	4	6	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

2

i=2

j := 1 to 8

```
if A[ 2 ] > A[ 3 ] then  
begin  
    k := A[ 2 ];  
    A[ 2 ] := A[ 3 ];  
    A[ 3 ] := k;
```

1	2	4	8	3	5	4	6	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

3

i=2

j := 1 to 8

if A[ 3 ] > A[ 4 ] then  
begin

k := A[ 3 ];  
A[ 3 ] := A[ 4 ];  
A[ 4 ] := k;

1	2	4	8	3	5	4	6	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

4

i=2

j := 1 to 8

```
if A[ 4 ] > A[ 5 ] then  
begin  
    k := A[ 4 ];  
    A[ 4 ] := A[ 5 ];  
    A[ 5 ] := k;
```

1	2	4	3	8	5	4	6	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

5

i=2

j := 1 to 8

```
if A[ 5 ] > A[ 6 ] then  
begin  
    k := A[ 5 ];  
    A[ 5 ] := A[ 6 ];  
    A[ 6 ] := k;
```

1	2	4	3	5	8	4	6	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

i=2  
j := 1 to 8

```
if A[ 6 ] > A[ 7 ] then
begin
    k := A[ 6 ];
    A[ 6 ] := A[ 7 ];
    A[ 7 ] := k;
```

1	2	4	3	5	4	8	6	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

i=2  
j := 1 to 8

```
if A[ 7 ] > A[ 8 ] then
begin
    k := A[ 7 ];
    A[ 7 ] := A[ 8 ];
    A[ 8 ] := k;
```

1	2	4	3	5	4	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

8

i=2

j := 1 to 8

```
if A[ 8 ] > A[ 9 ] then  
begin  
    k := A[ 8 ];  
    A[ 8 ] := A[ 9 ];  
    A[ 9 ] := k;
```

1	2	4	3	5	4	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

1

i=3

j := 1 to 7

```
if A[ 1 ] > A[ 2 ] then  
begin  
    k := A[ 1 ];  
    A[ 1 ] := A[ 2 ];  
    A[ 2 ] := k;
```

1	2	4	3	5	4	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

2

i=3

j := 1 to 7

if A[ 2 ] > A[ 3 ] then  
begin

k := A[ 2 ];  
A[ 2 ] := A[ 3 ];  
A[ 3 ] := k;

1	2	4	3	5	4	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j := 3

i=3

j := 1 to 7

```
if A[ 3 ] > A[ 4 ] then  
begin  
    k := A[ 3 ];  
    A[ 3 ] := A[ 4 ];  
    A[ 4 ] := k;
```

1	2	3	4	5	4	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

4

i=3

j := 1 to 7

```
if A[ 4 ] > A[ 5 ] then  
begin  
    k := A[ 4 ];  
    A[ 4 ] := A[ 5 ];  
    A[ 5 ] := k;
```

1	2	3	4	5	4	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

5

i=3

j := 1 to 7

if A[ 5 ] > A[ 6 ] then  
begin

k := A[ 5 ];  
A[ 5 ] := A[ 6 ];  
A[ 6 ] := k;

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

i=3  
j := 1 to 7

```
if A[ 6 ] > A[ 7 ] then
begin
    k := A[ 6 ];
    A[ 6 ] := A[ 7 ];
    A[ 7 ] := k;
```

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

7

i=3

j := 1 to 7

if A[ 7 ] > A[ 8 ] then  
begin

k := A[ 7 ];  
A[ 7 ] := A[ 8 ];  
A[ 8 ] := k;

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

1

i=4

j := 1 to 6

```
if A[ 1 ] > A[ 2 ] then  
begin  
    k := A[ 1 ];  
    A[ 1 ] := A[ 2 ];  
    A[ 2 ] := k;
```

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

2

i=4

j := 1 to 6

```
if A[ 2 ] > A[ 3 ] then  
begin  
    k := A[ 2 ];  
    A[ 2 ] := A[ 3 ];  
    A[ 3 ] := k;
```

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

3

i=4

j := 1 to 6

```
if A[ 3 ] > A[ 4 ] then  
begin  
    k := A[ 3 ];  
    A[ 3 ] := A[ 4 ];  
    A[ 4 ] := k;
```

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

4

i=4

j := 1 to 6

```
if A[ 4 ] > A[ 5 ] then  
begin  
    k := A[ 4 ];  
    A[ 4 ] := A[ 5 ];  
    A[ 5 ] := k;
```

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

5

i=4

j := 1 to 6

```
if A[ 5 ] > A[ 6 ] then  
begin  
    k := A[ 5 ];  
    A[ 5 ] := A[ 6 ];  
    A[ 6 ] := k;
```

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

i=4  
j := 1 to 6

```
if A[ 6 ] > A[ 7 ] then
begin
    k := A[ 6 ];
    A[ 6 ] := A[ 7 ];
    A[ 7 ] := k;
```

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

1

i=5

j := 1 to 5

```
if A[ 1 ] > A[ 2 ] then  
begin  
    k := A[ 1 ];  
    A[ 1 ] := A[ 2 ];  
    A[ 2 ] := k;
```

1	2	3	4	4	5	6	8	9	10
---	---	---	---	---	---	---	---	---	----

k

j :=

2

i=5

j := 1 to 5

if A[ 2 ] > A[ 3 ] then  
begin

k := A[ 2 ];

A[ 2 ] := A[ 3 ];

A[ 3 ] := k;



Программа будет выполняться до конца  
цикла для  $j$  и для  $i$ .

$i=5$

$j := 1 \text{ to } 5$

$i=6$

$j := 1 \text{ to } 4$

$i=7$

$j := 1 \text{ to } 3$

$i=8$

$j := 1 \text{ to } 2$

$i=9$

$j := 1 \text{ to } 1$

$i=10$