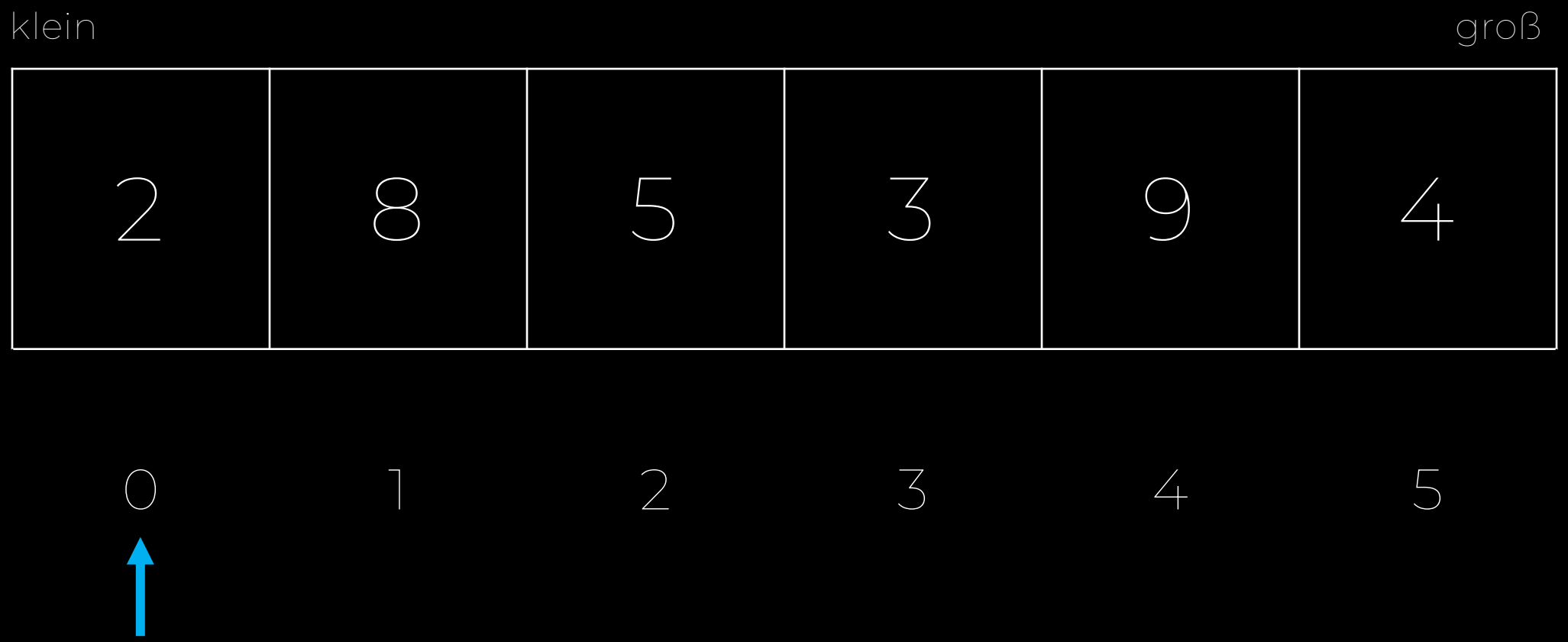
Informatik Q1 Abels

Sortieralgorithmen

Sortieralgorithmen

Insertionsort

Insertionsort



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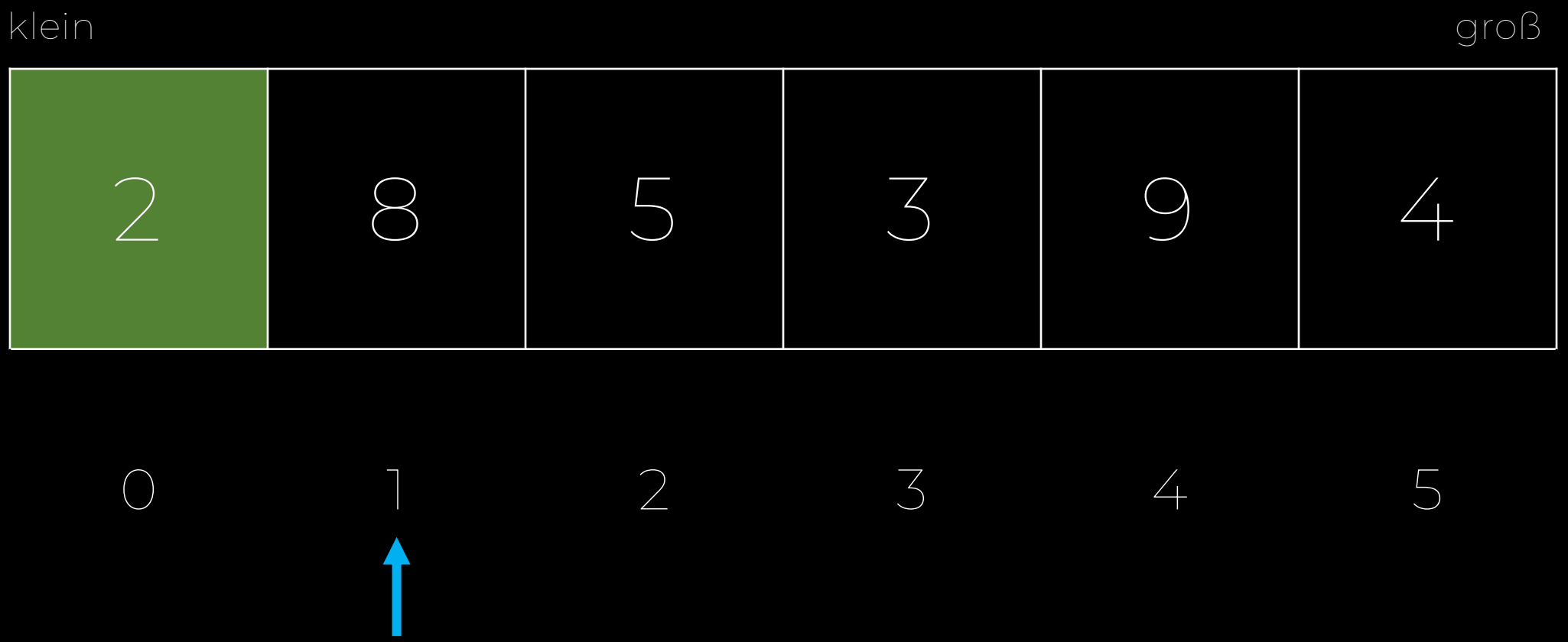

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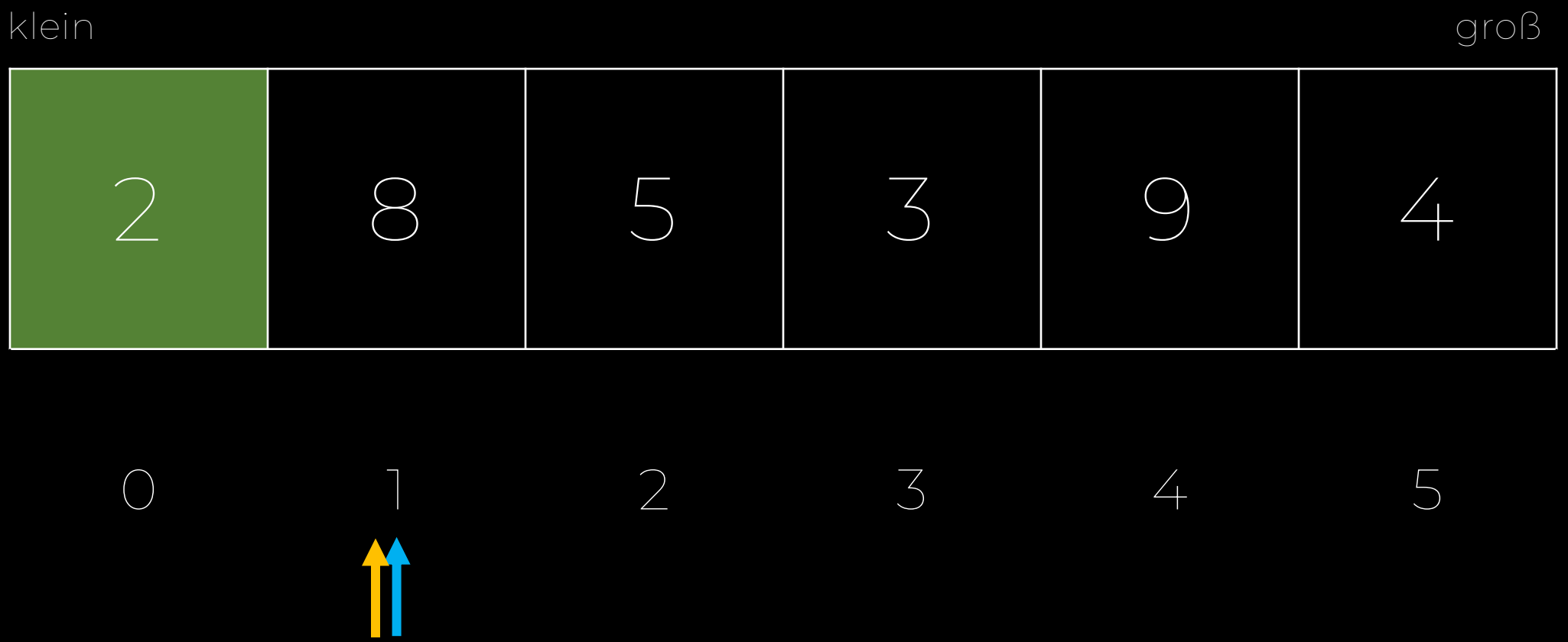

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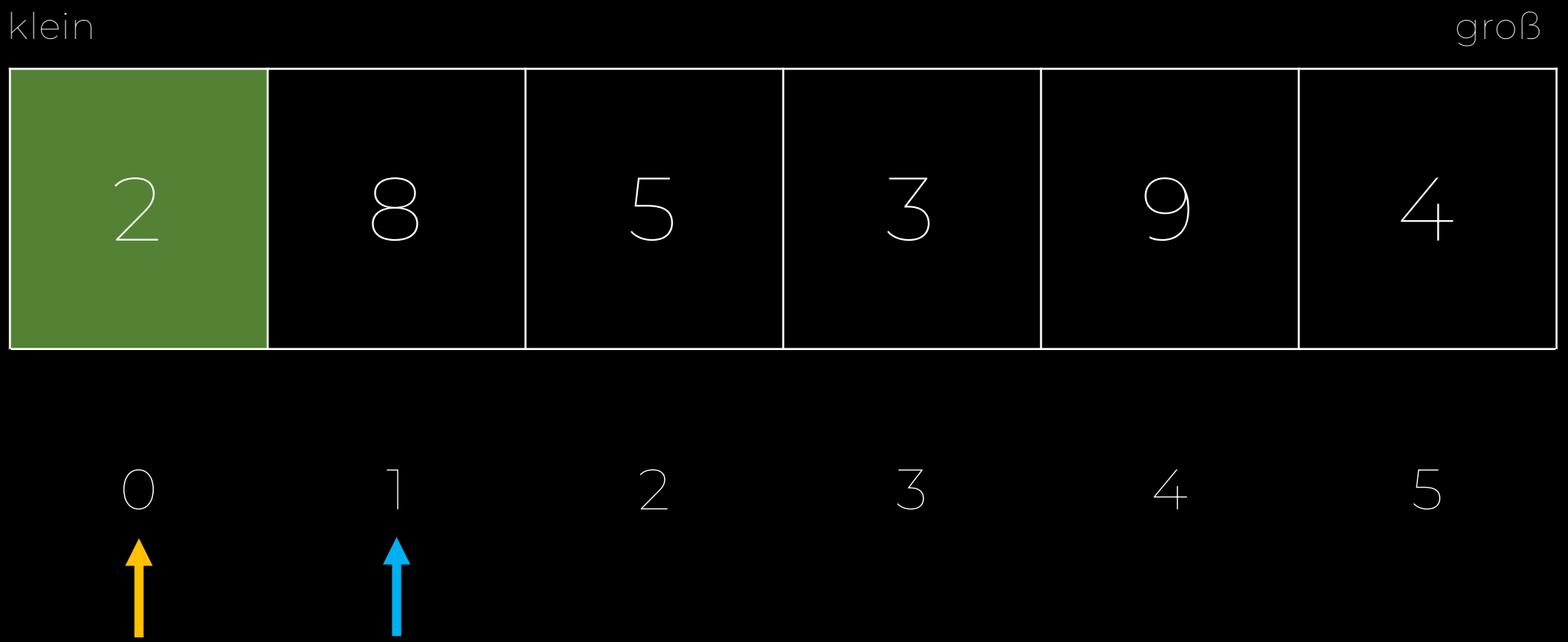

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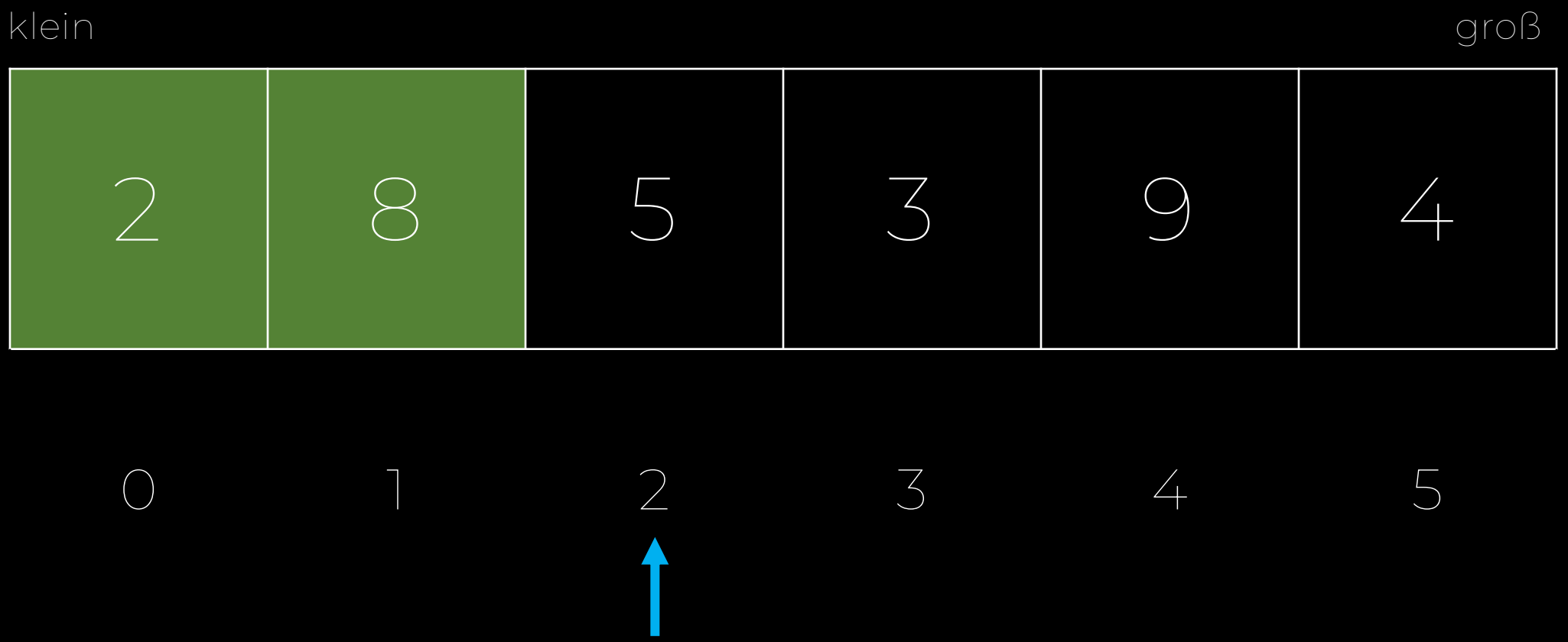

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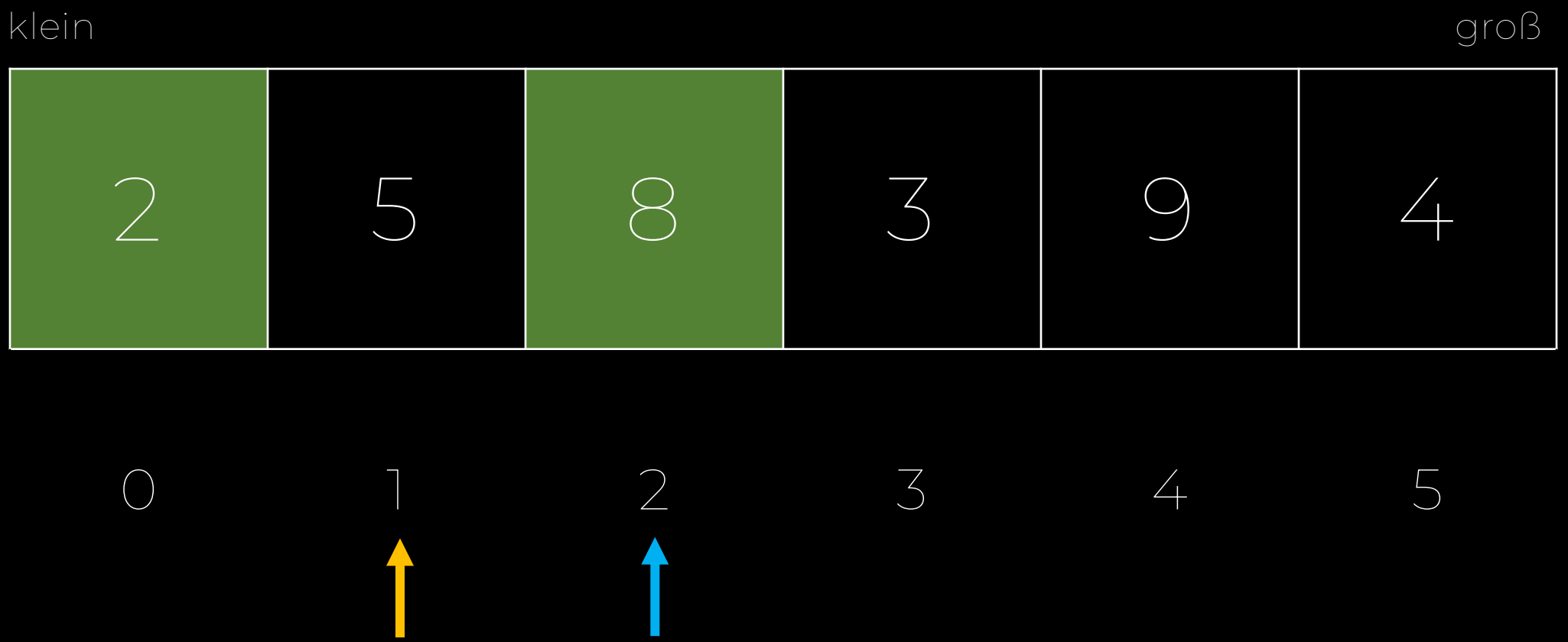

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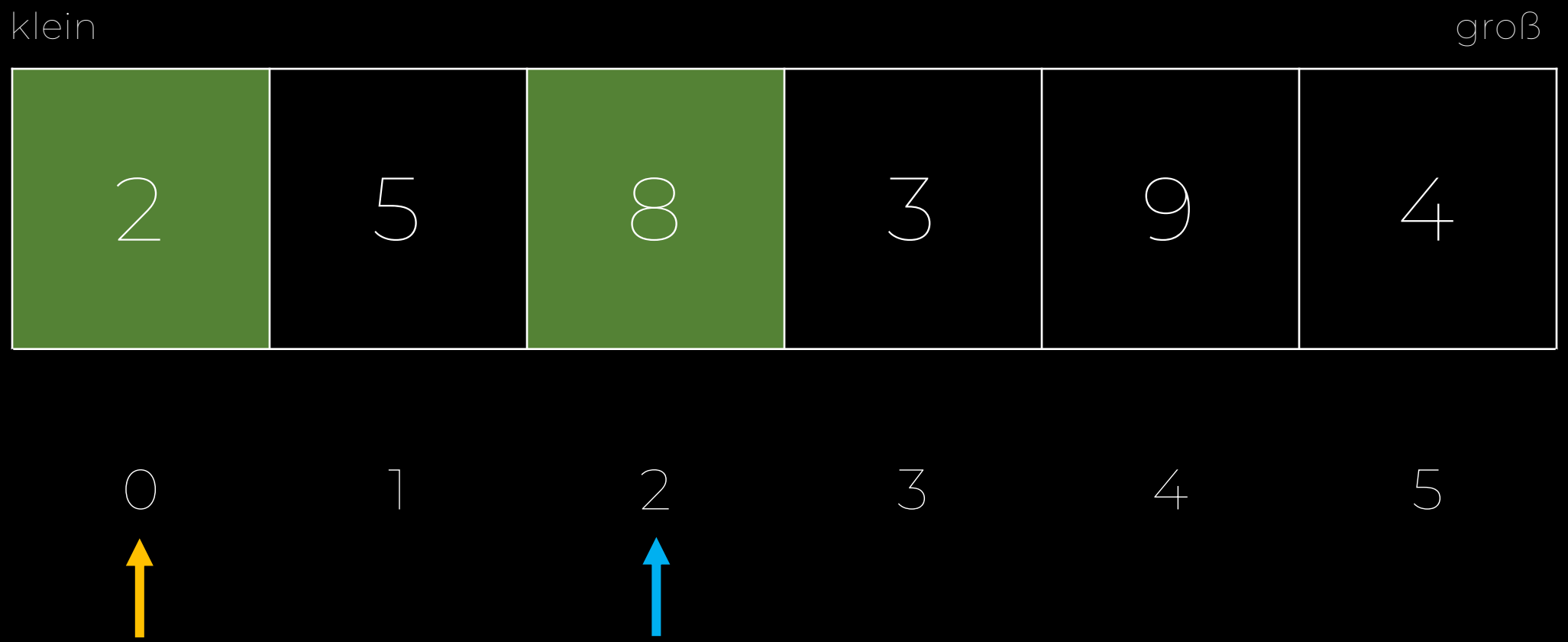

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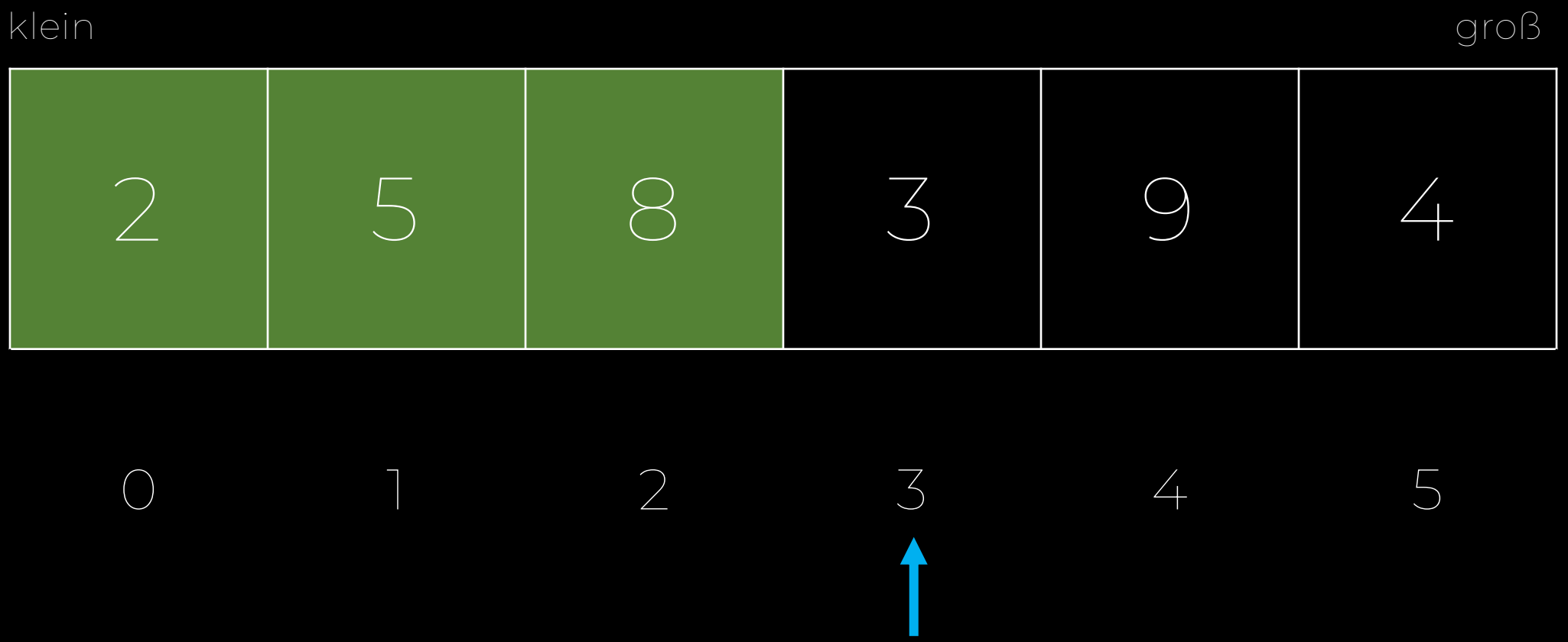

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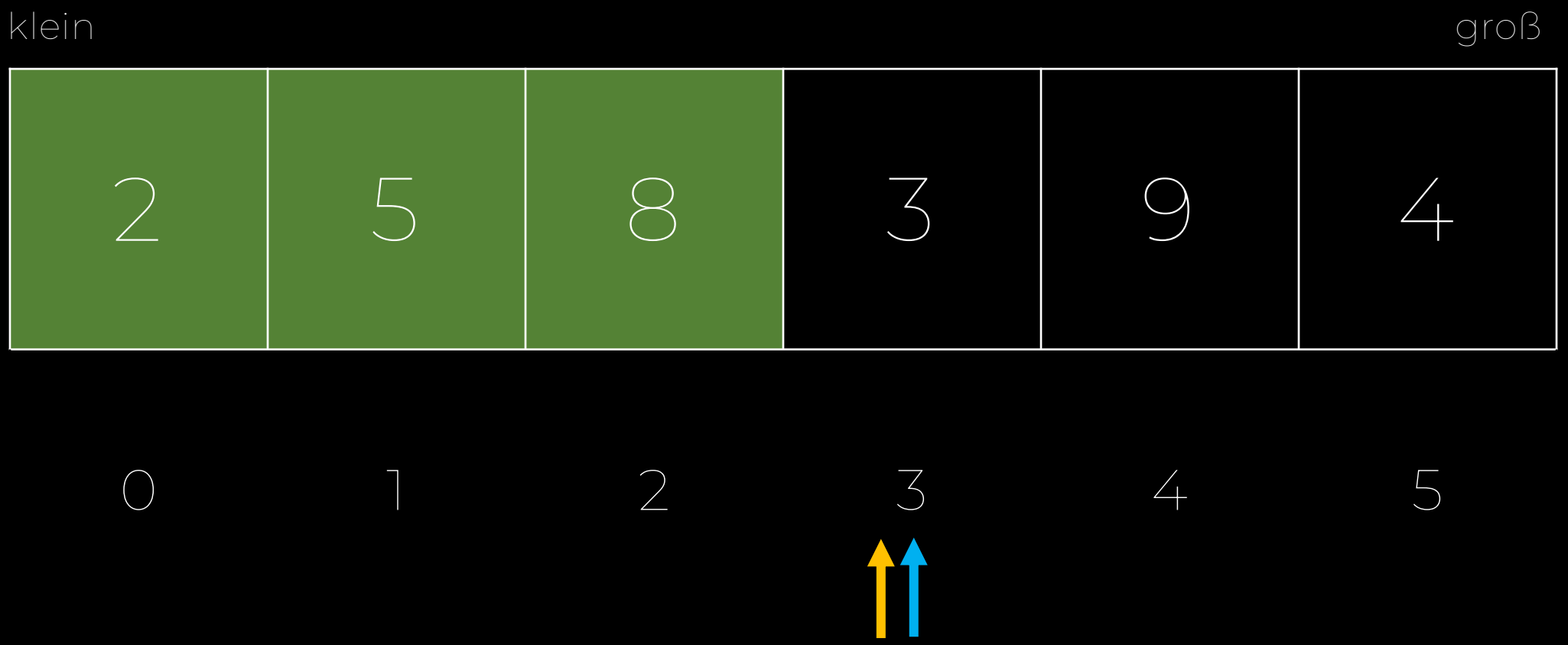

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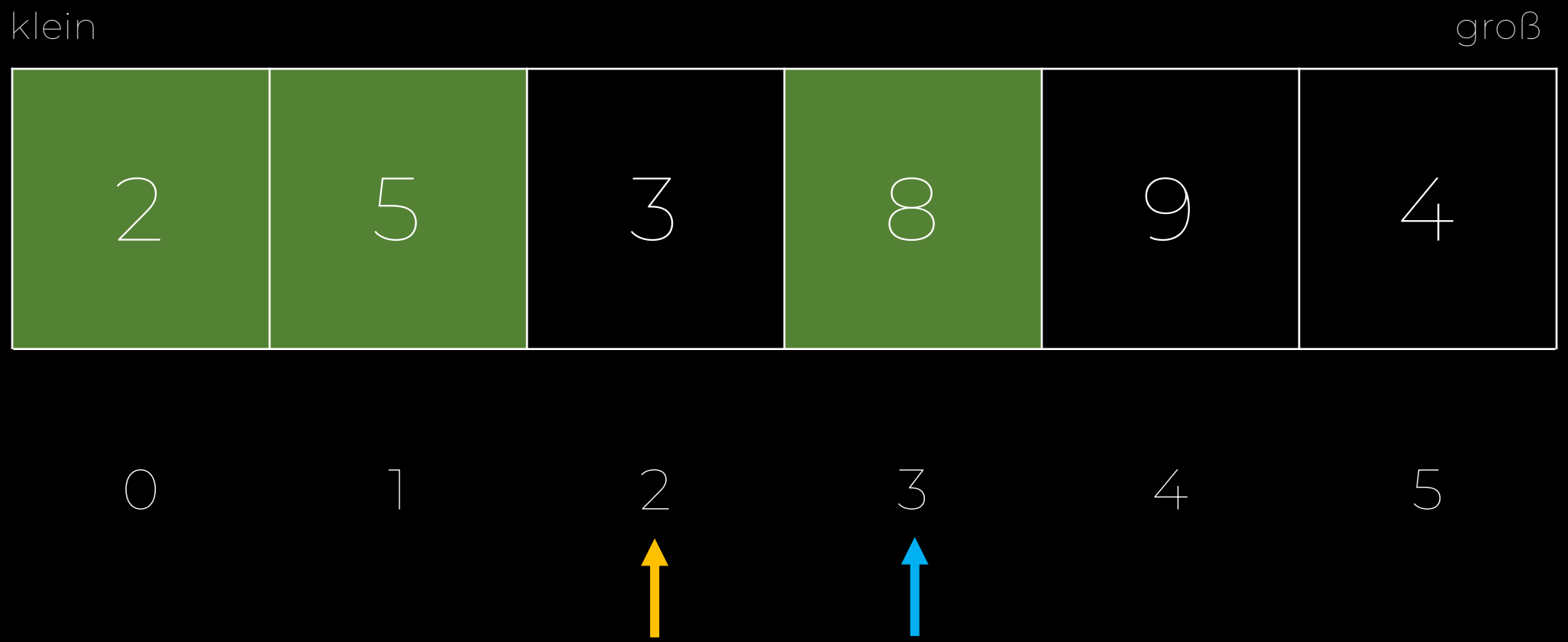

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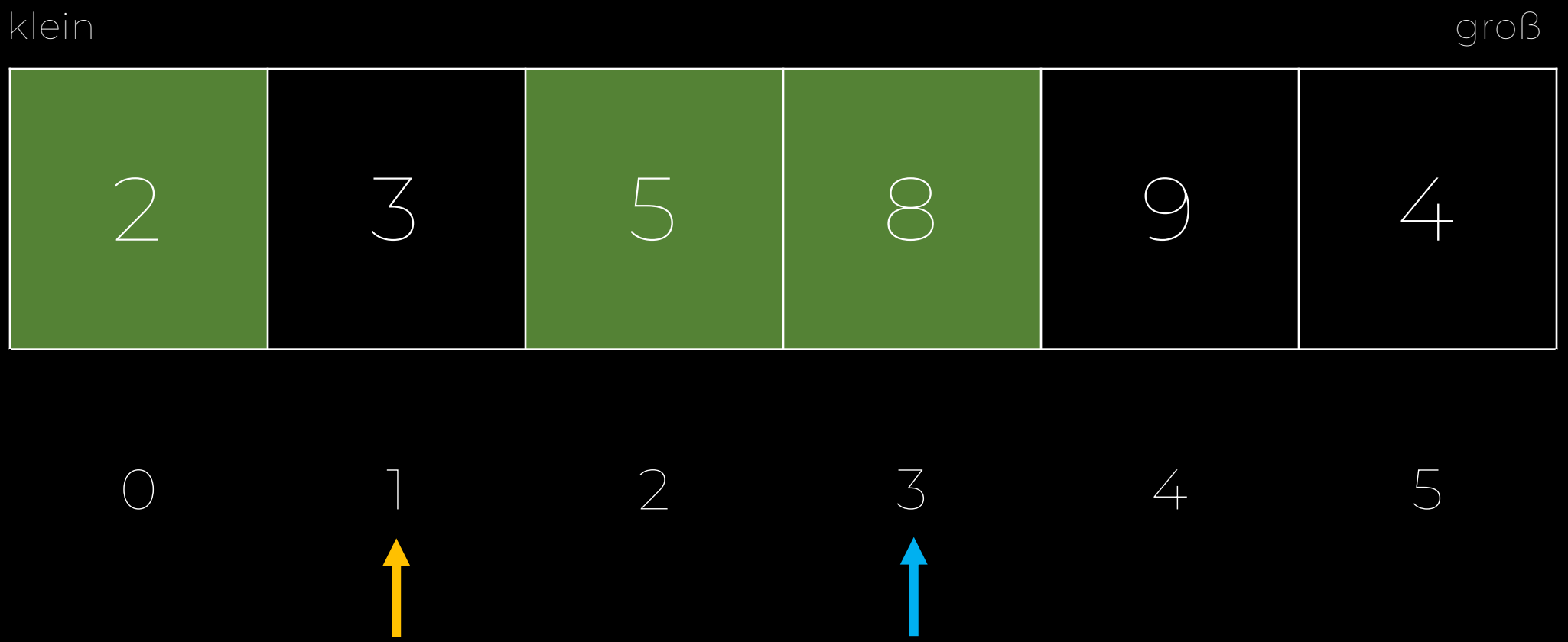

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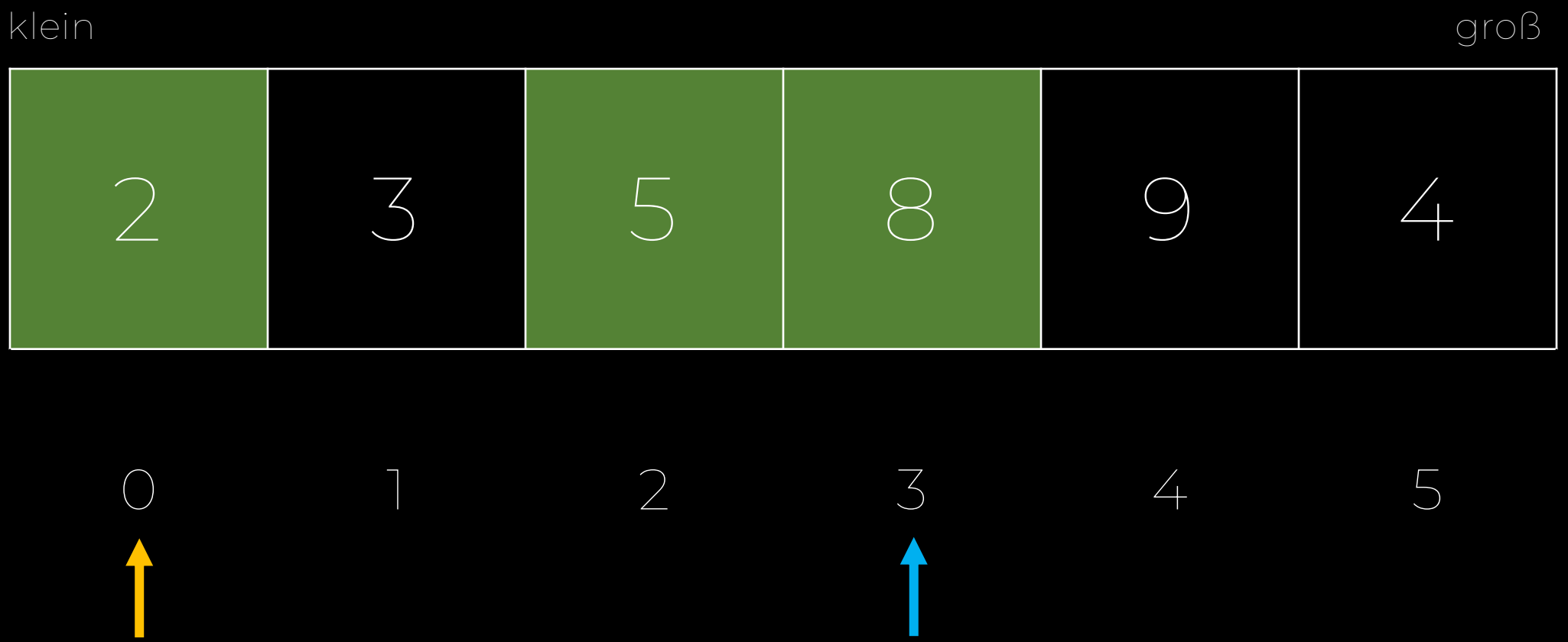

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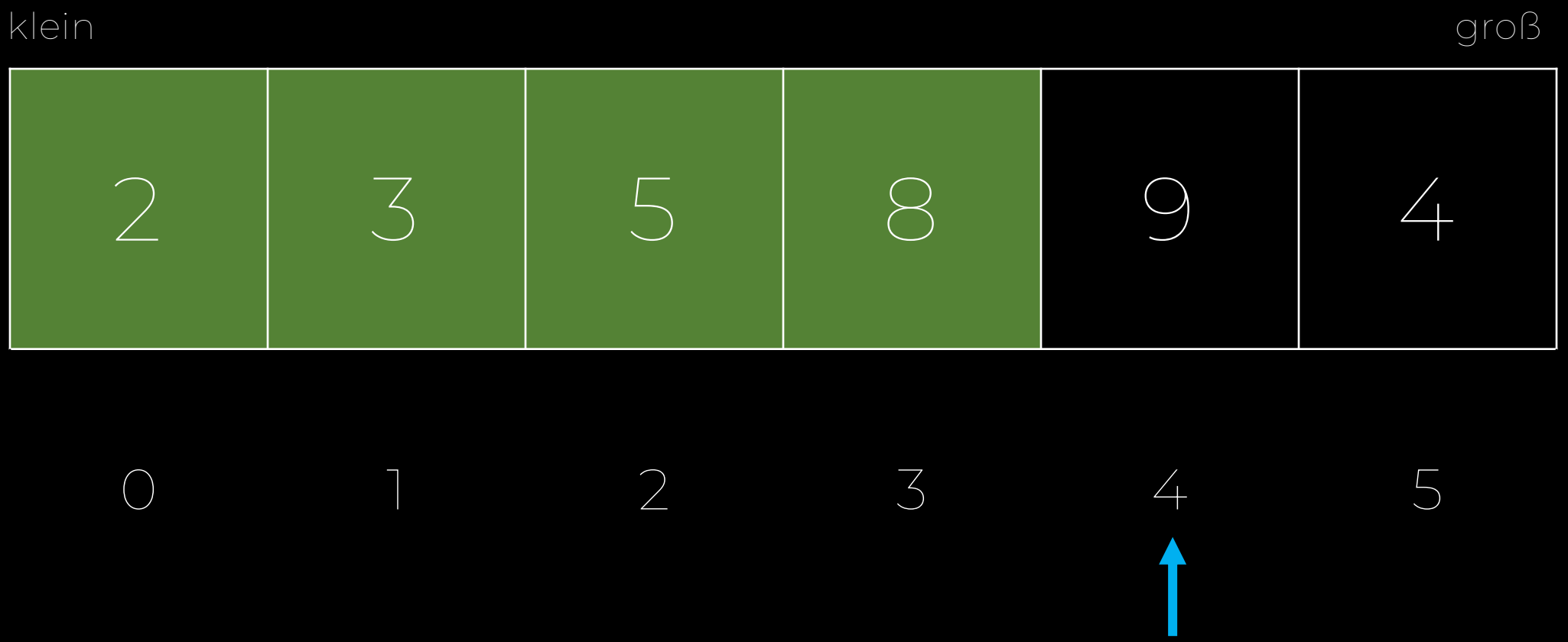

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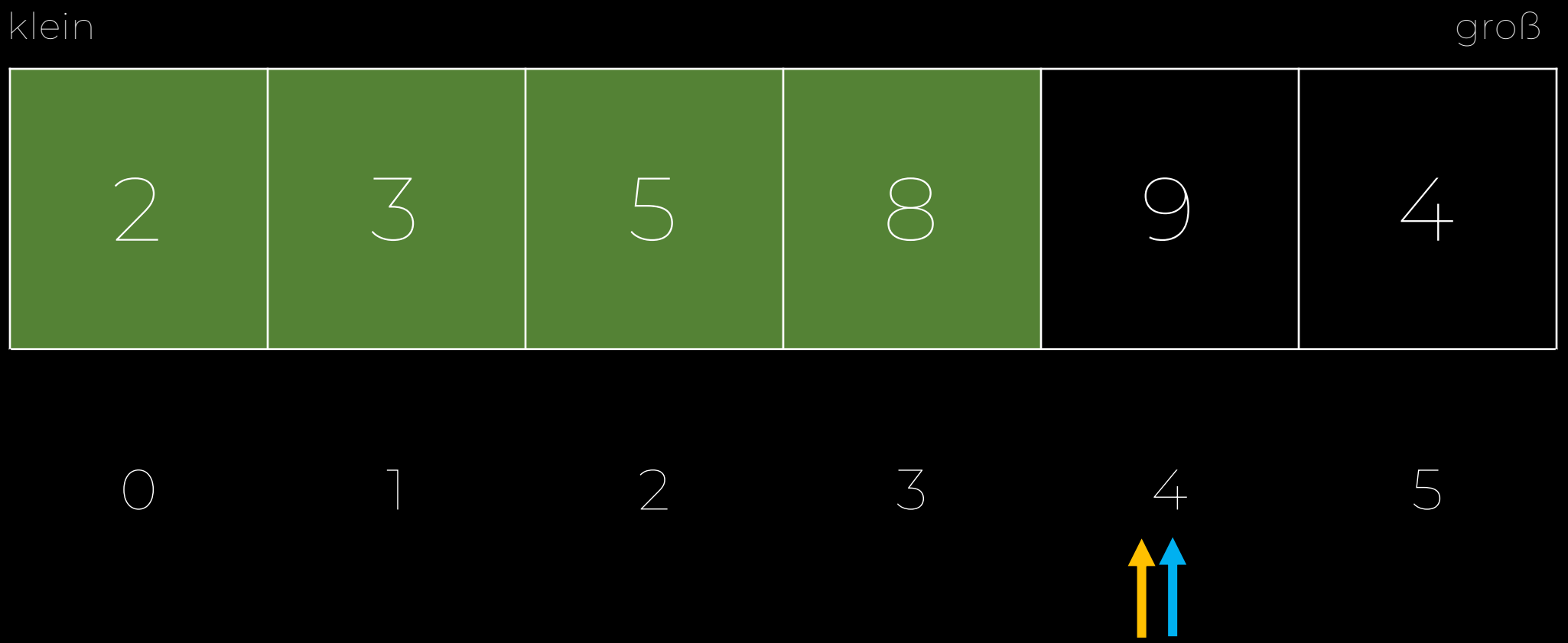

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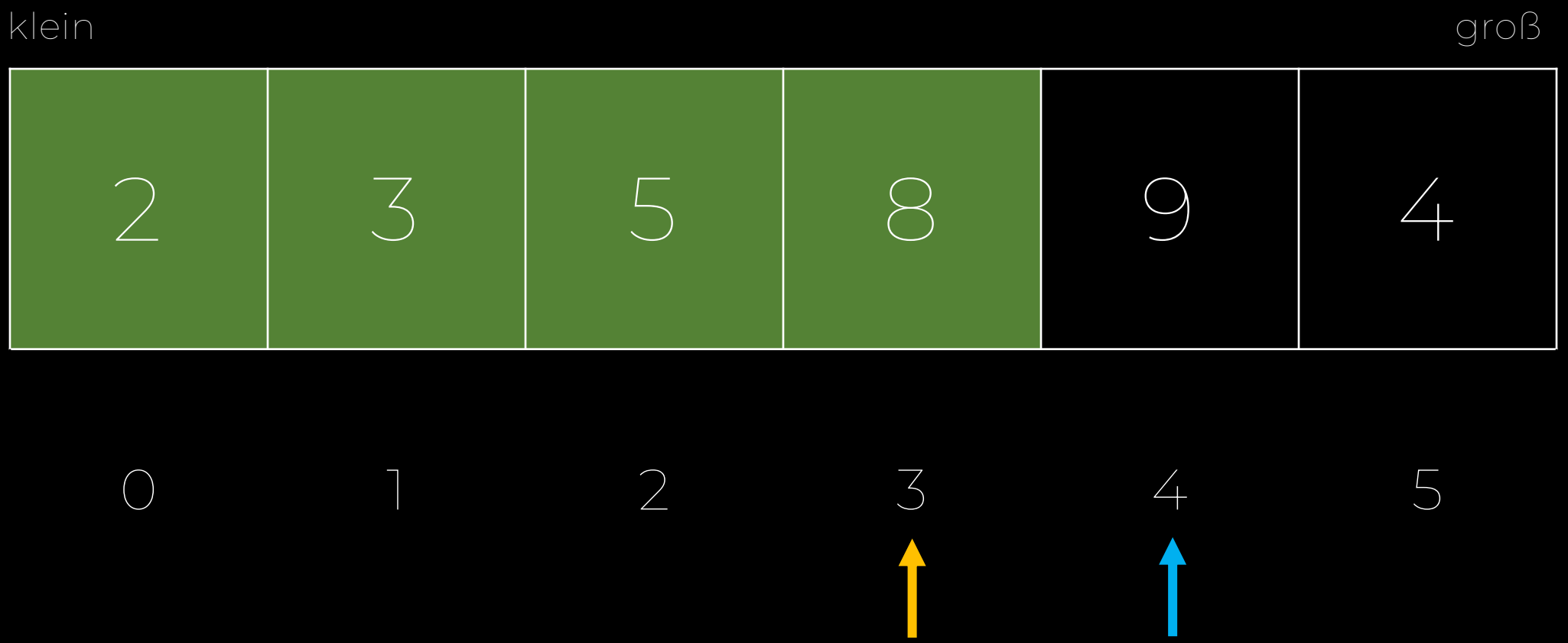

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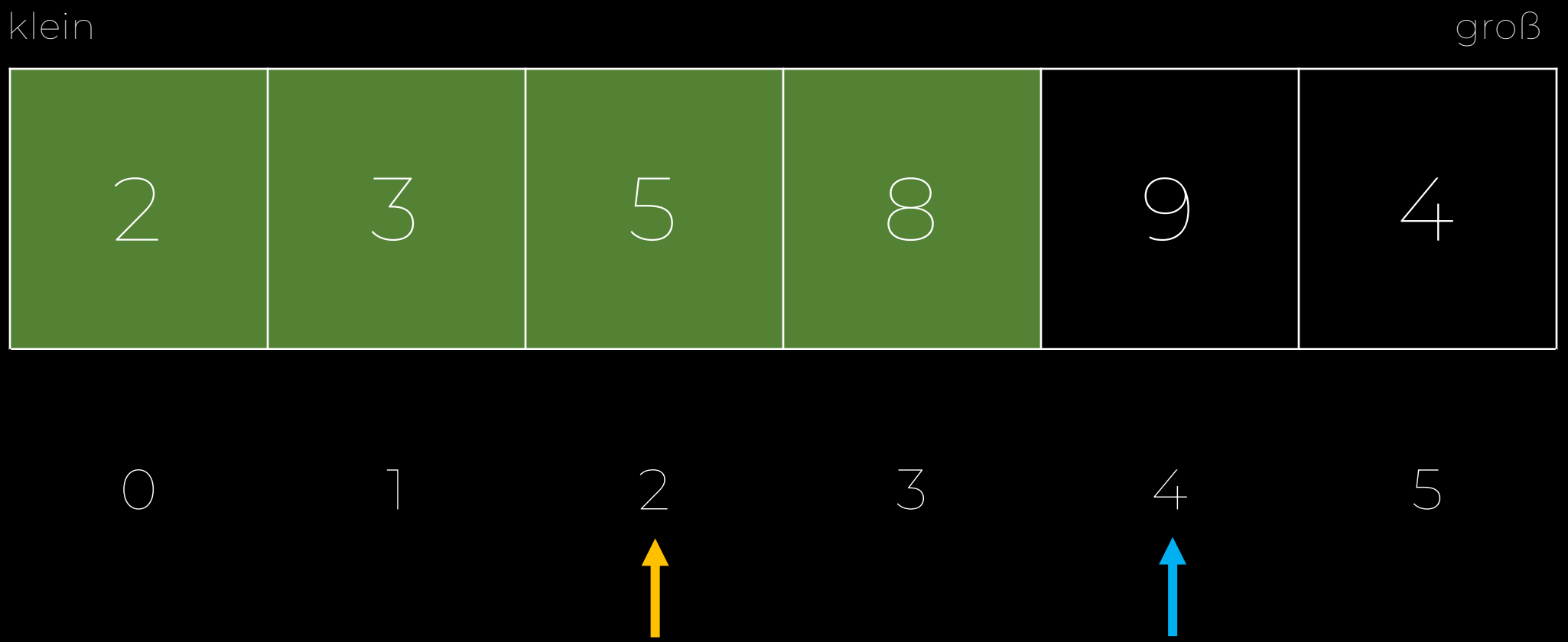

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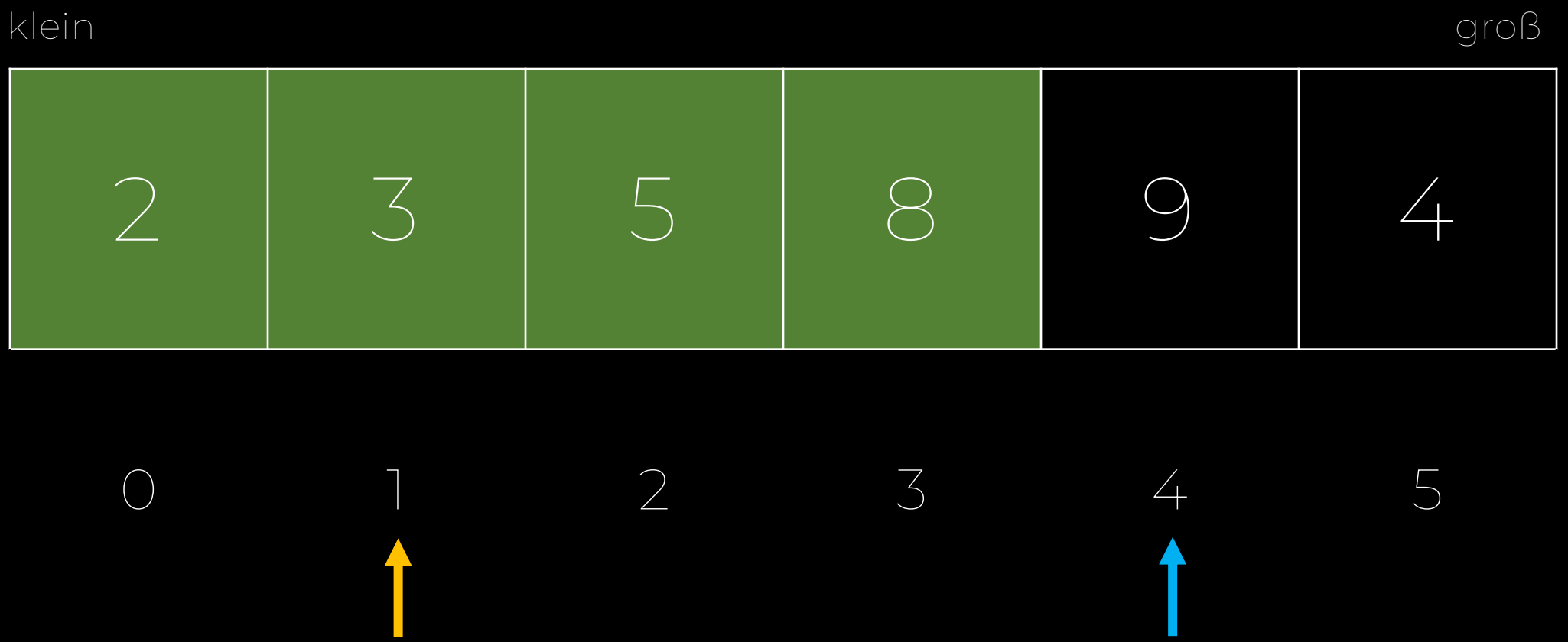

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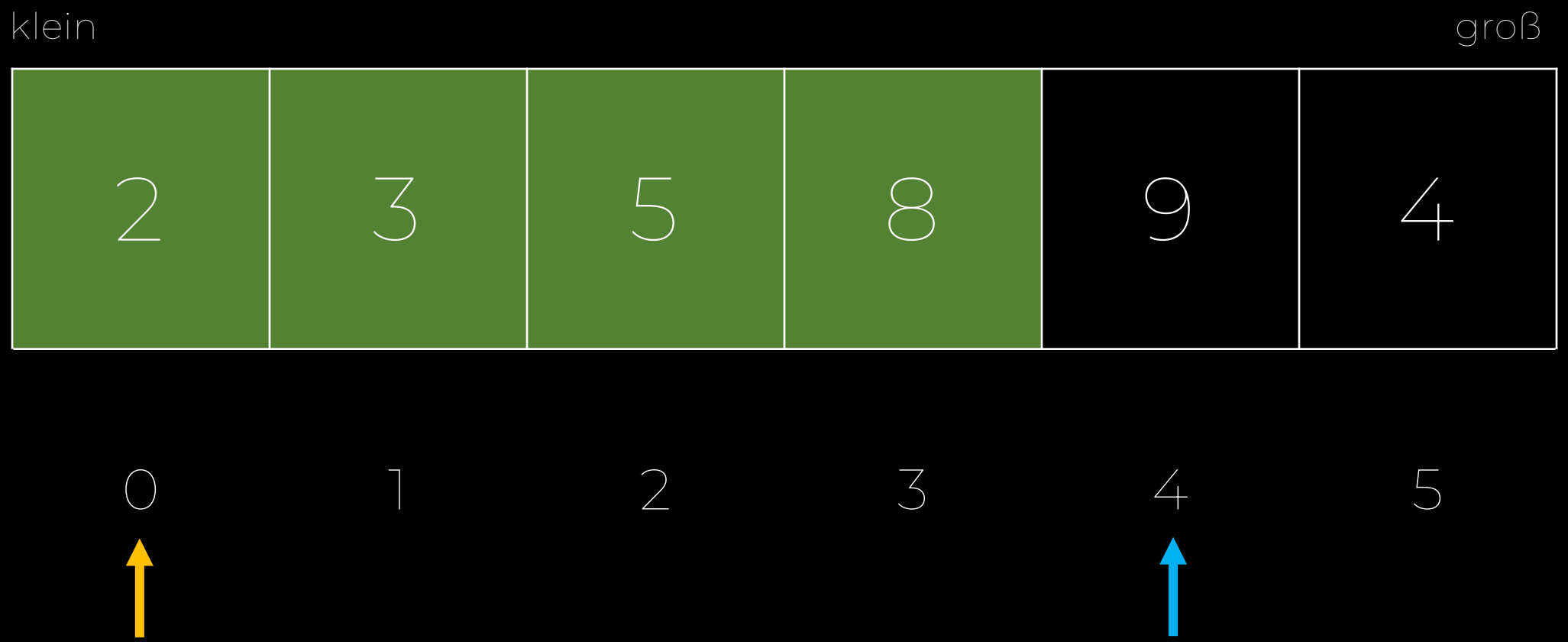

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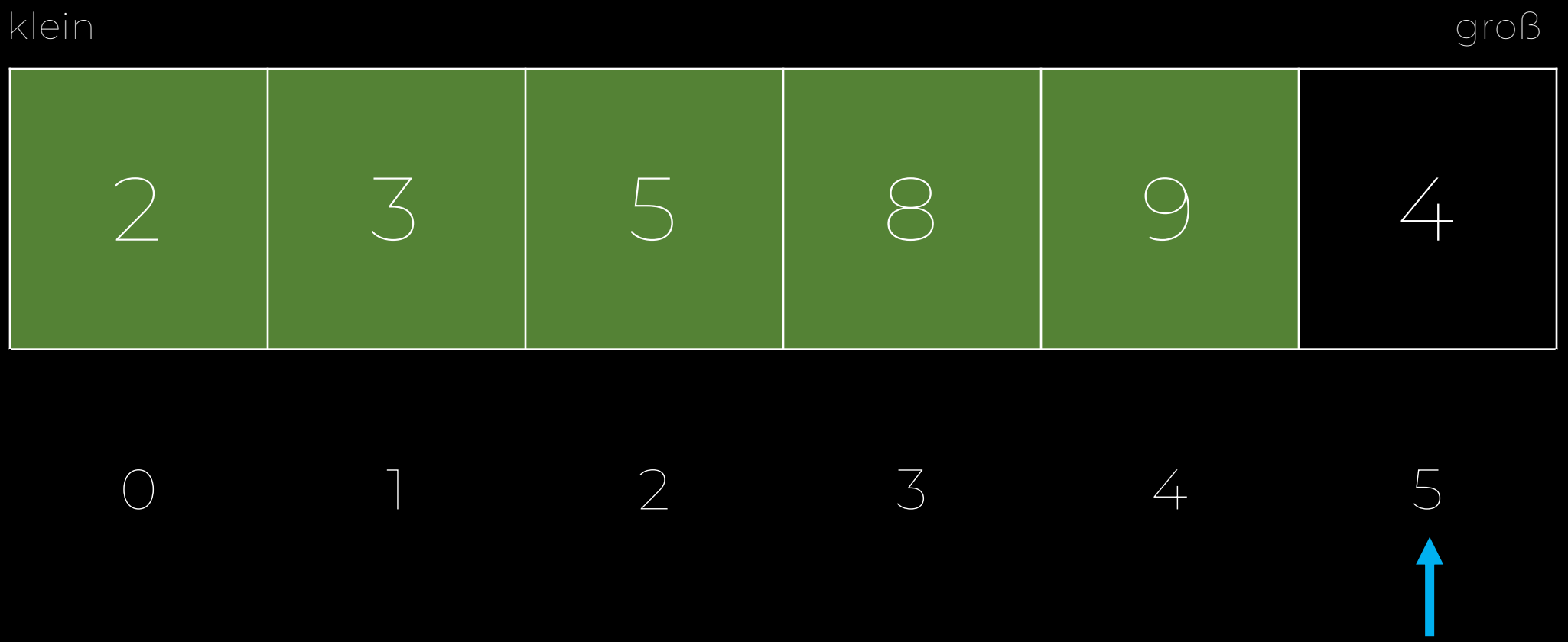

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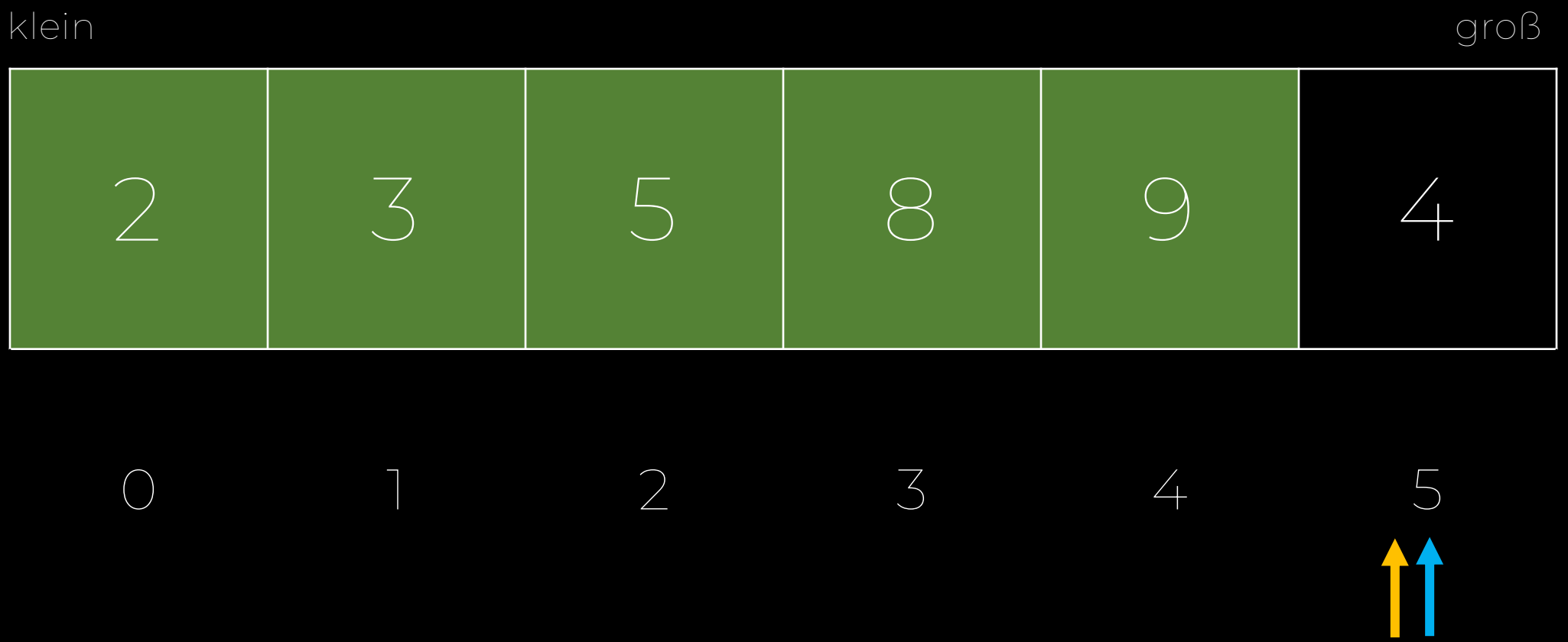

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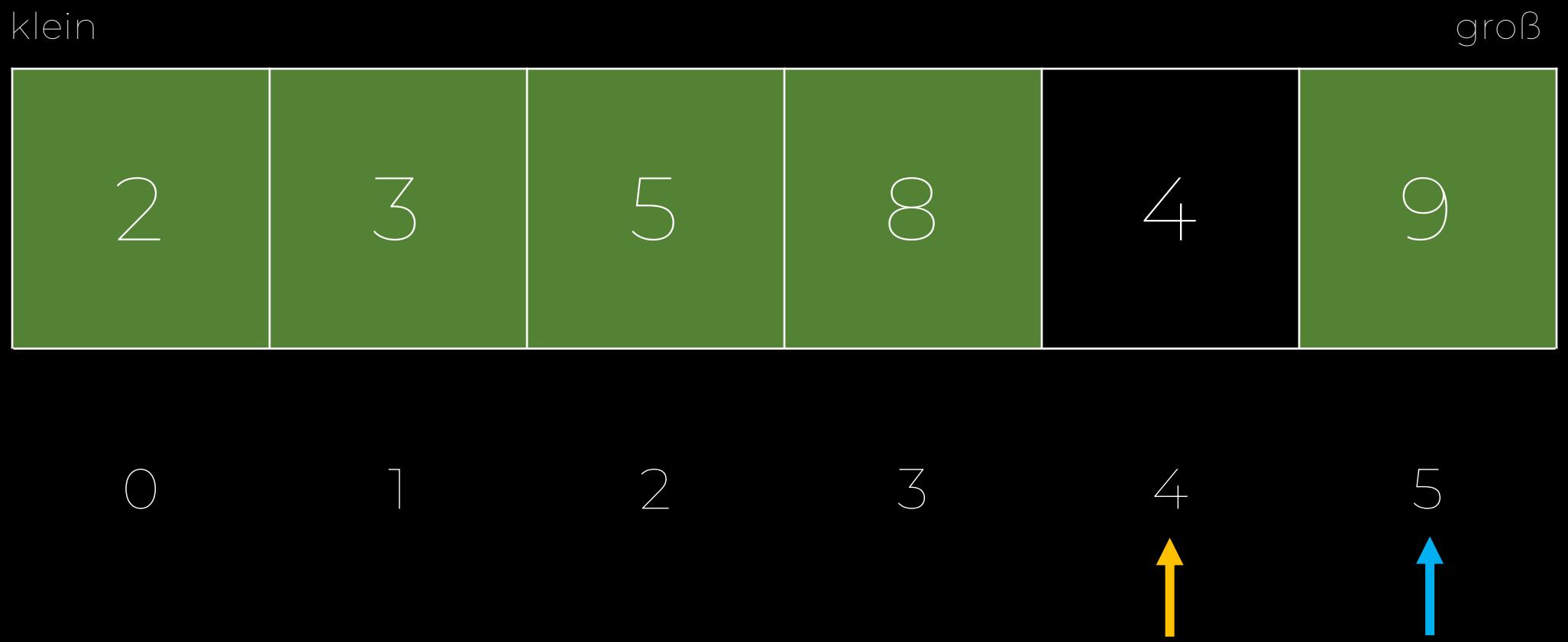

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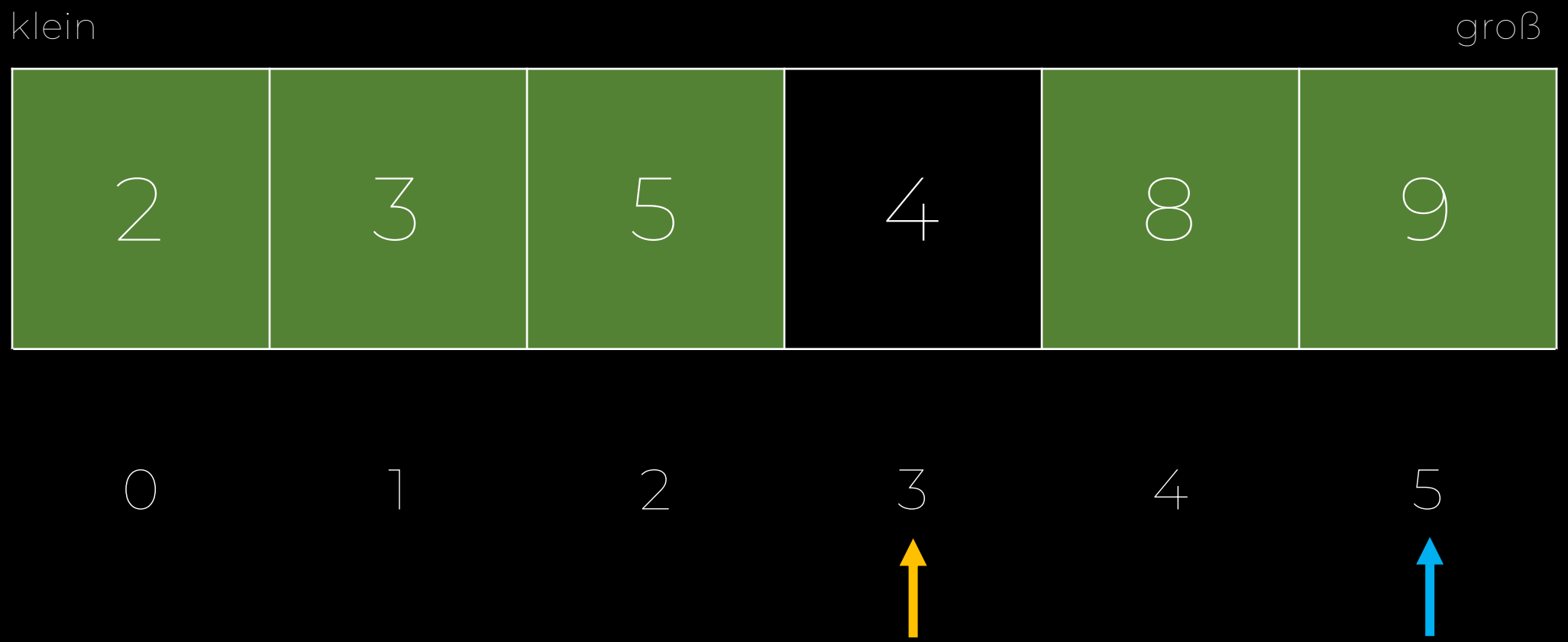

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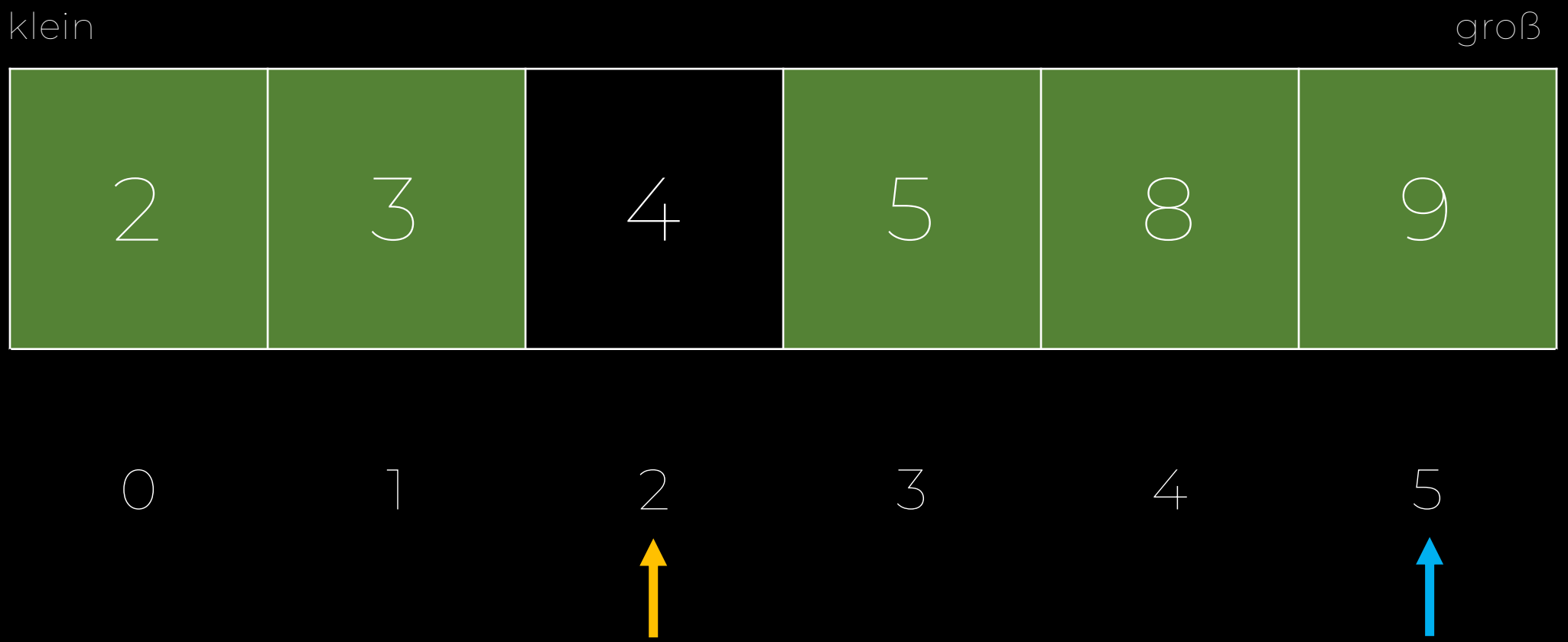

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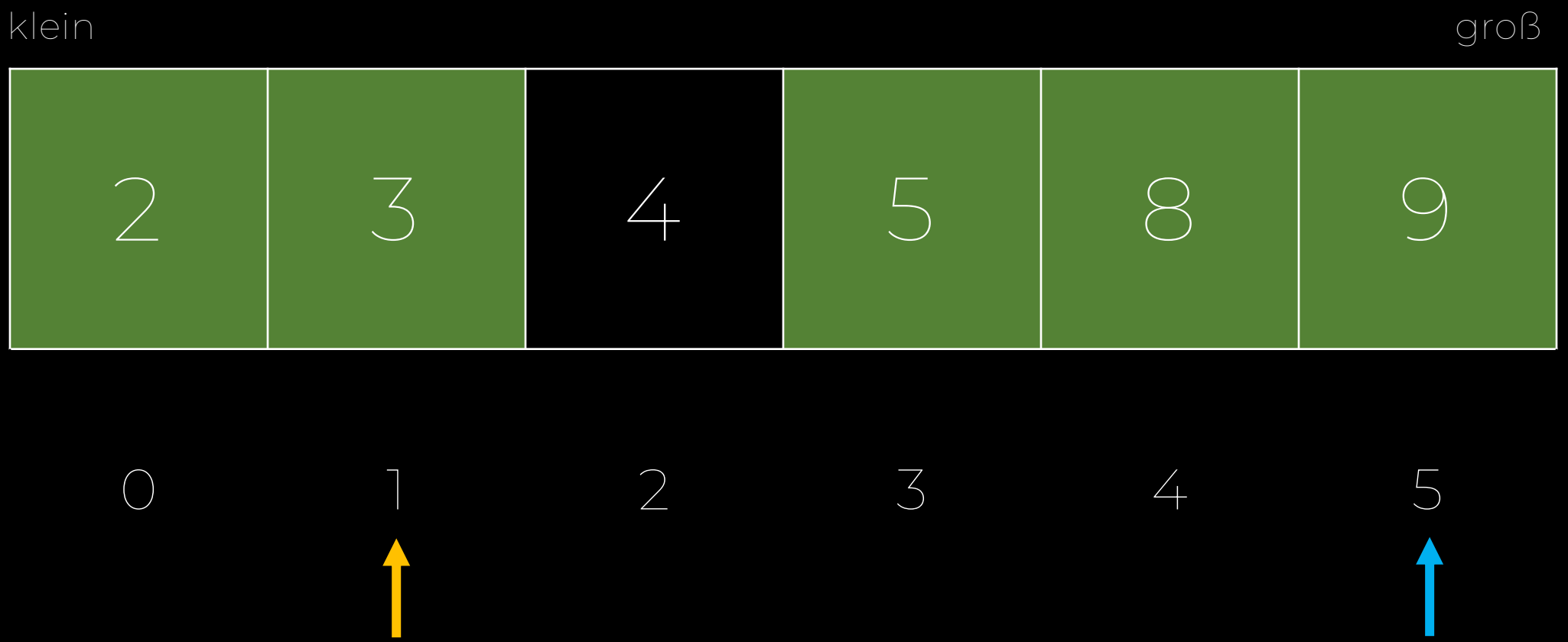

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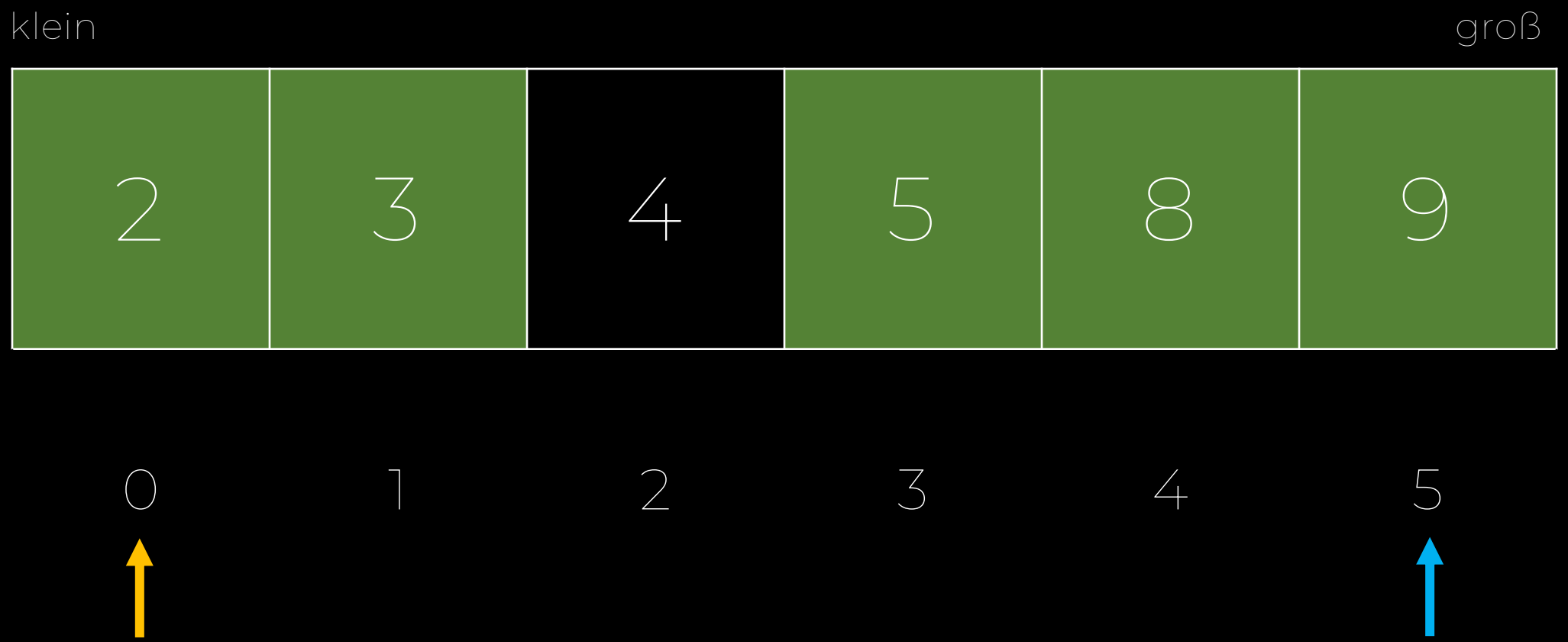

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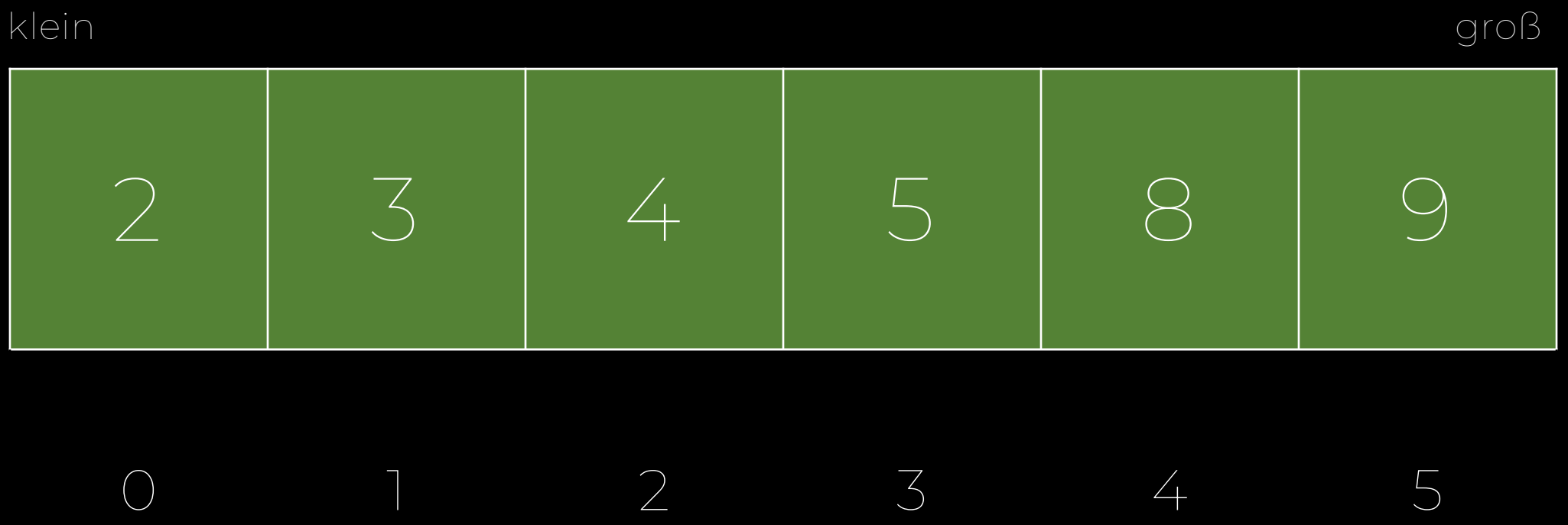


Übung 1

a) Sortiere folgenden Zahlenfolge mit dem Insertionsort:

```
5 2 4 6 1 3
```

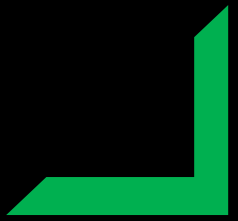
b) Erkläre den Insertionsort in deinen eigenen Worten.

c) Analysiere die Komplexität (Laufzeit) des Insertionsort.

d) Zeichne ein Struktogramm zum Insertionsort.

e) Erstelle ein Programm namens **Sortierverfahren** und implementiere folgende Funktion:

```
int[] insertionSort(int[] unsorted)
```



Übung 1

5 2 4 6 1 3

5 2 4 6 1 3

2 5 4 6 1 3

2 4 5 6 1 3

2 4 5 6 1 3

1 2 4 5 6 3

1 2 3 4 5 6

Sortierverfahren.java

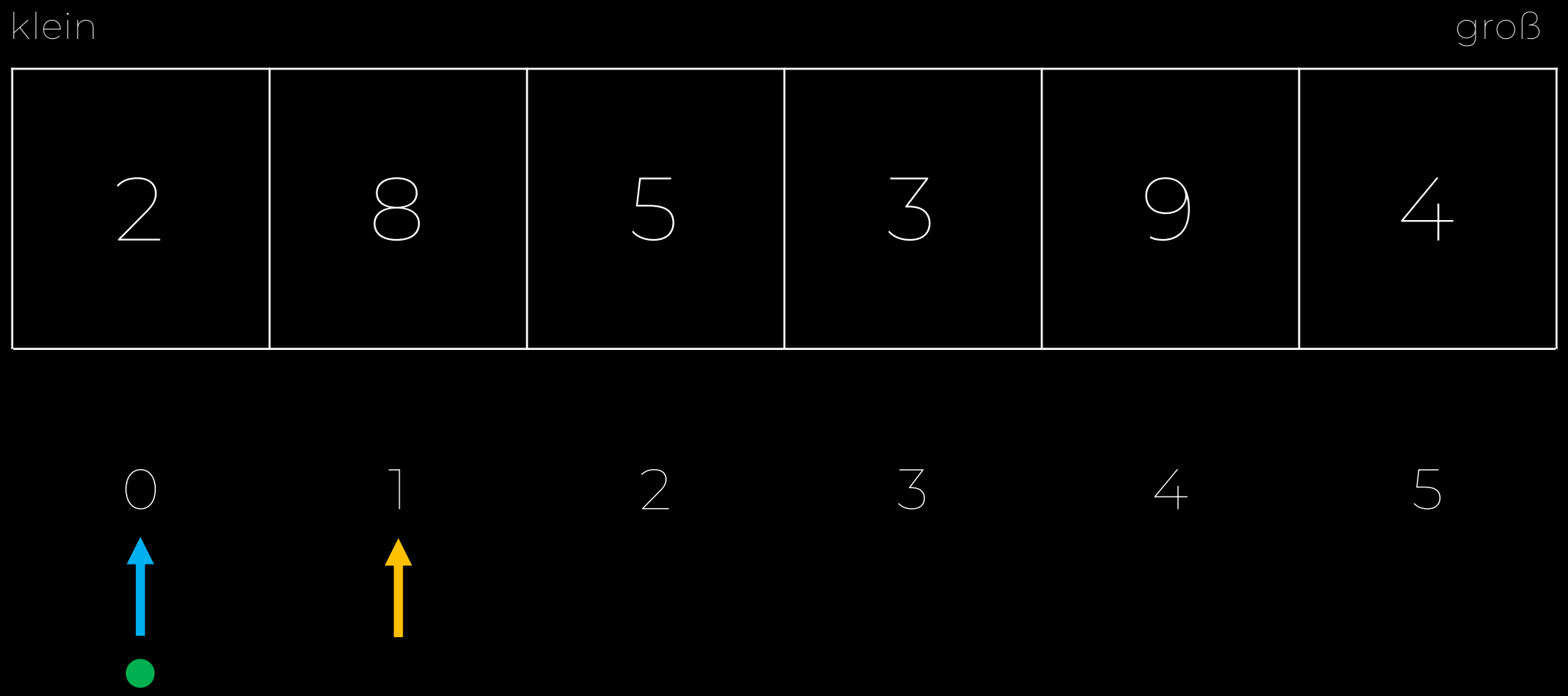
```java
public class Sortierverfahren {
    public static void main(String[] args) {
        int[] unsorted = {5, 2, 4, 6, 1, 3};
        int[] sorted = insertionSort(unsorted);
        for (int i : unsorted) System.out.print(i + ", ");
        for (int i : sorted) System.out.print(i + ", ");
    }

    public static int[] insertionSort(int[] list) {
        int tmp;
        for (int i = 1; i < list.length; i++) {
            tmp = list[i];
            int j = i;
            while (j > 0 && list[j-1] > tmp) {
                list[j] = list[j-1];
                j--;
            }
            list[j] = tmp;
        }
        return list;
    }
}
```

Der Algorithmus hat 2 verschachtelte Schleifen mit je Länge (fast) n

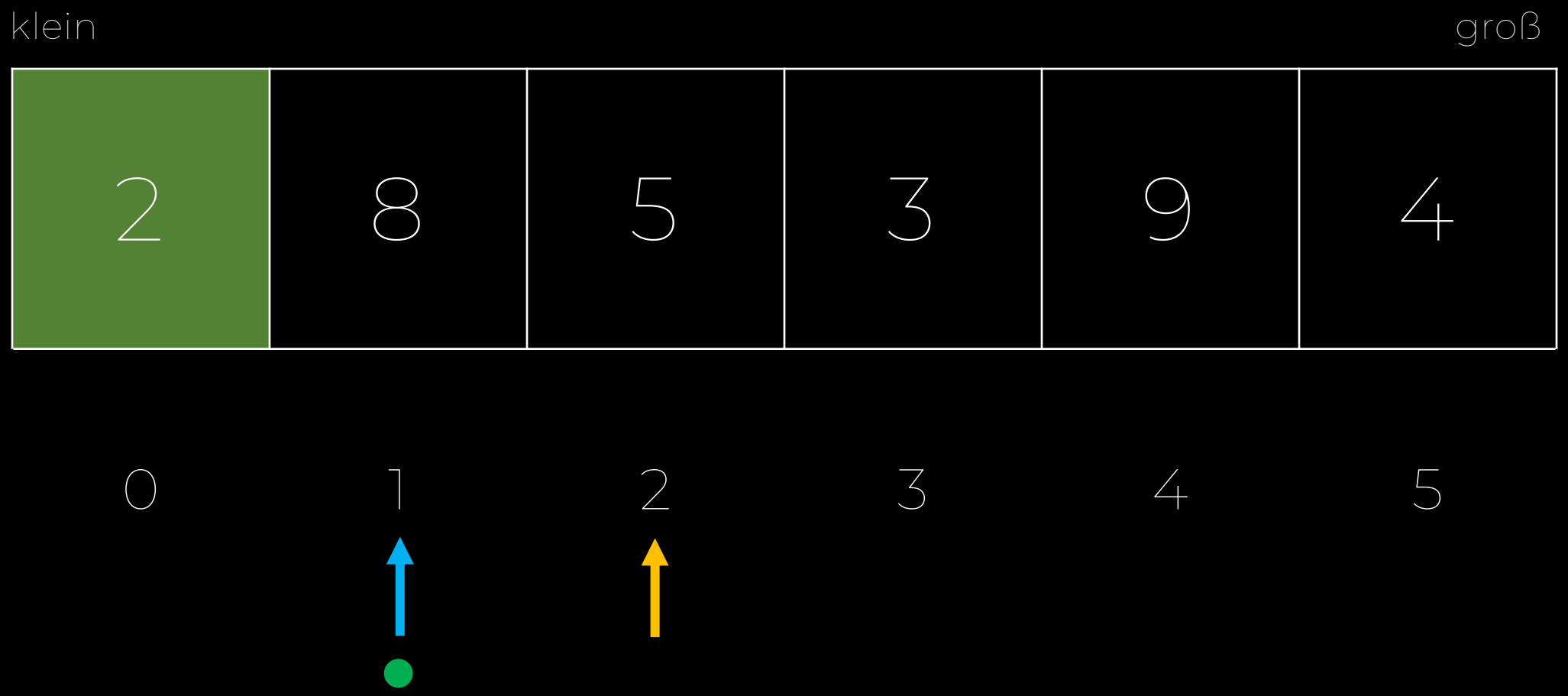
=> $O(n^2)$

Selectionsort

Selectionsort

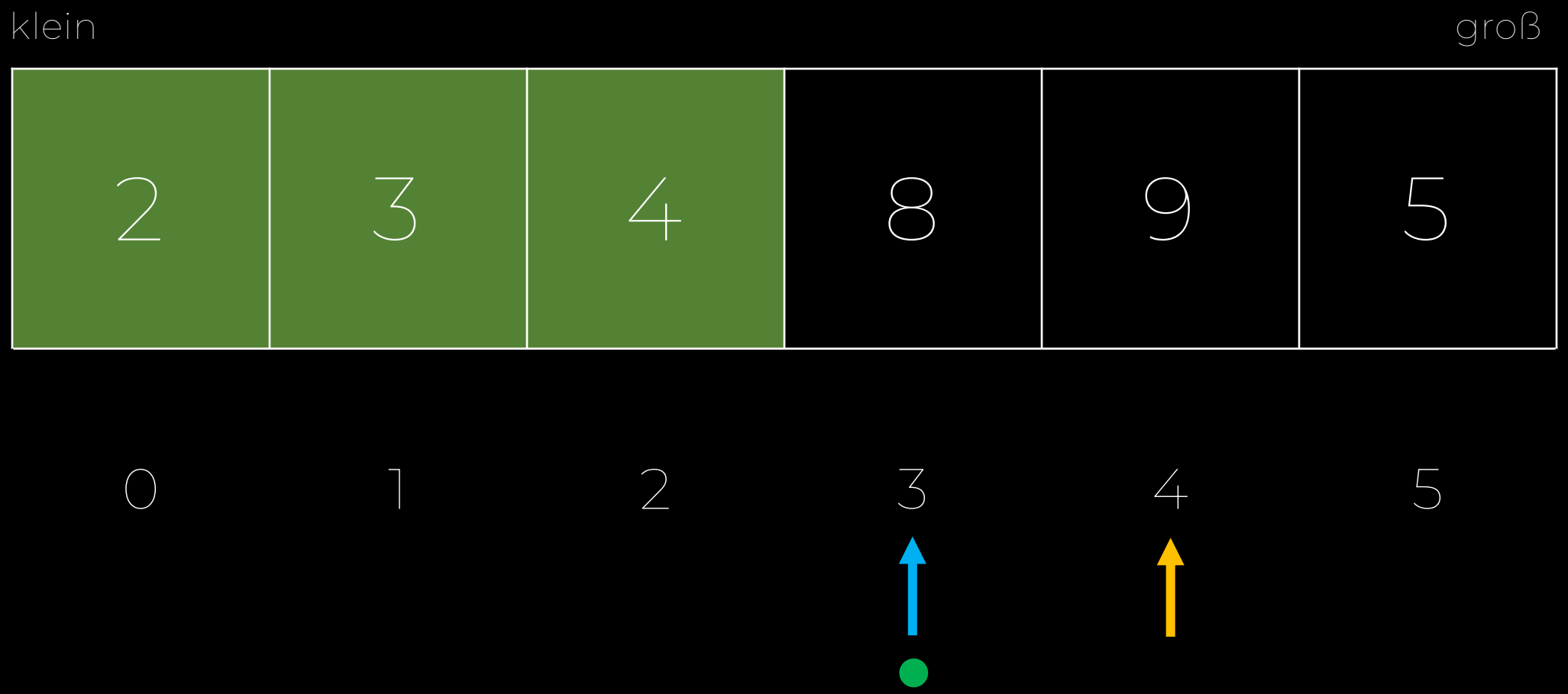


Selectionsort

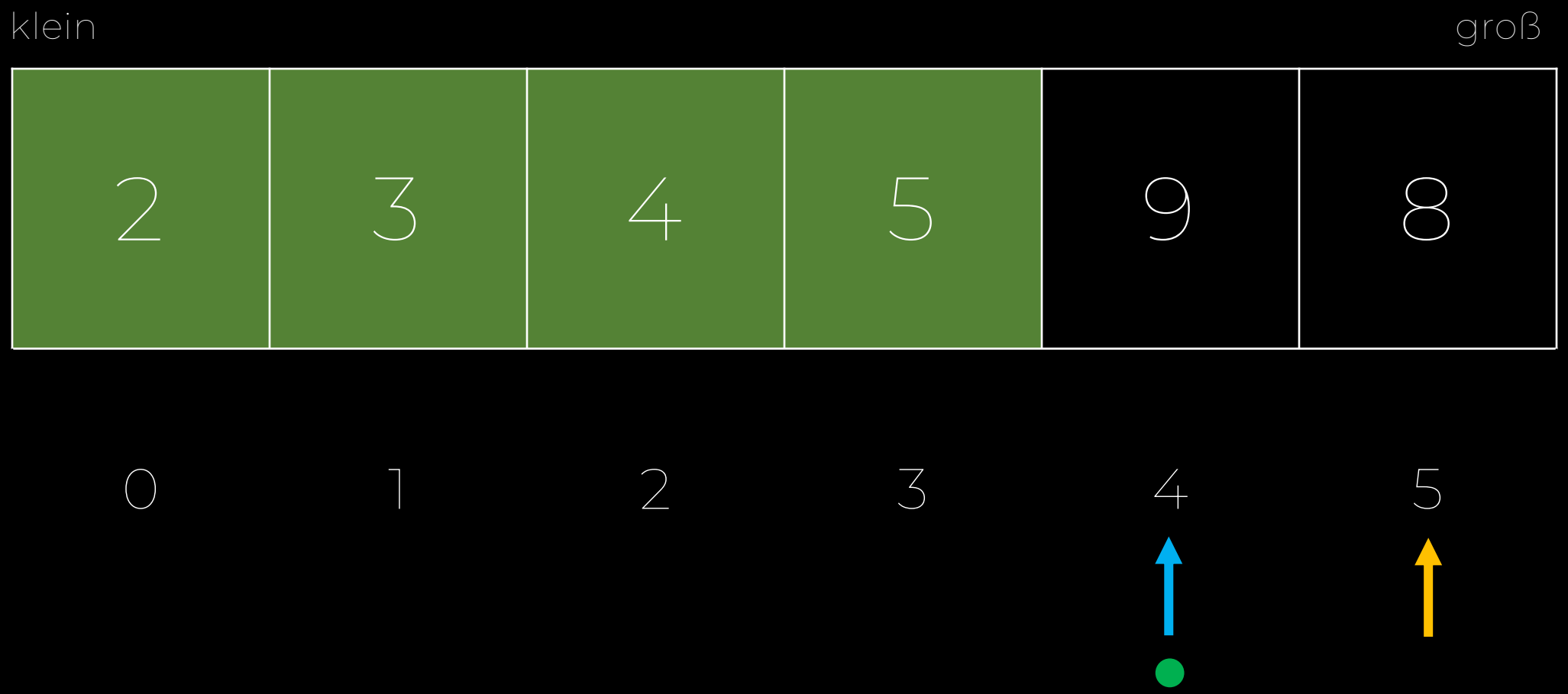


Selectionsort

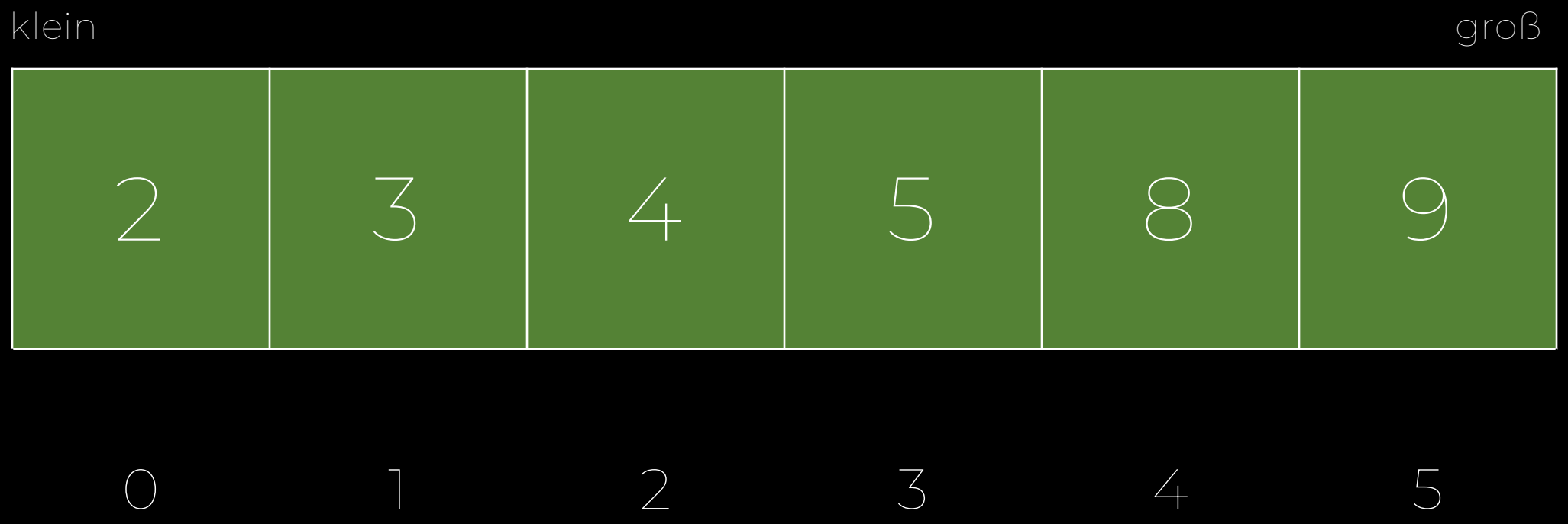
Selectionsort



Selectionsort



Selectionsort



Übung 1

a) Sortiere folgenden Zahlenfolge mit dem Selectionsort:

```
5 2 4 6 1 3
```

b) Erkläre den Selectionsort in deinen eigenen Worten.

c) Analysiere die Komplexität (Laufzeit) des Selectionsort.

d) Zeichne ein Struktogramm zum Selectionsort.

e) Erstelle ein Programm namens **Sortierverfahren** und implementiere folgende Funktion:

```
int[] selectionSort(int[] unsorted)
```

Übung 1

5 2 4 6 1 3

1 2 4 6 5 3

1 2 4 6 5 3

1 2 3 6 5 4

1 2 3 4 5 6

1 2 3 4 5 6

1 2 3 4 5 6

Sortierverfahren.java

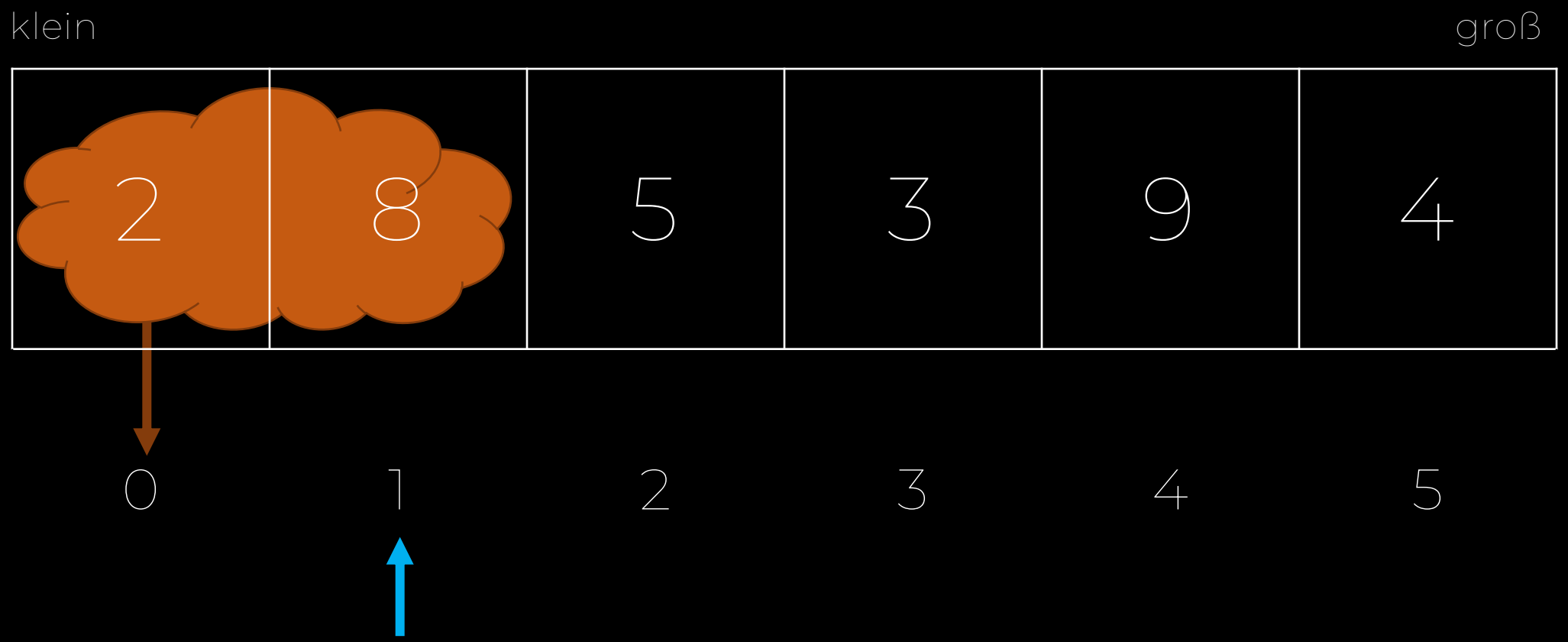
```java
public class Sortierverfahren {
    public static void main(String[] args) {
        int[] unsorted = {5, 2, 4, 6, 1, 3};
        int[] sorted = selectionSort(unsorted);
        for (int i : unsorted) System.out.print(i + ", ");
        for (int i : sorted) System.out.print(i + ", ");
    }

    public static int[] selectionSort(int[] list) {
        for (int i = 0; i < list.length - 1; i++) {
            int minIndex = i;

            for (int j = i + 1; j < list.length; j++) {
                if (list[j] < list[minIndex]) {
                    minIndex = j;
                }
            }

            int tmp = list[minIndex];
            list[minIndex] = list[i];
            list[i] = tmp;
        }
        return list;
    }
}
```

Der Algorithmus hat 2 verschachtelte Schleifen mit je Länge (fast) n

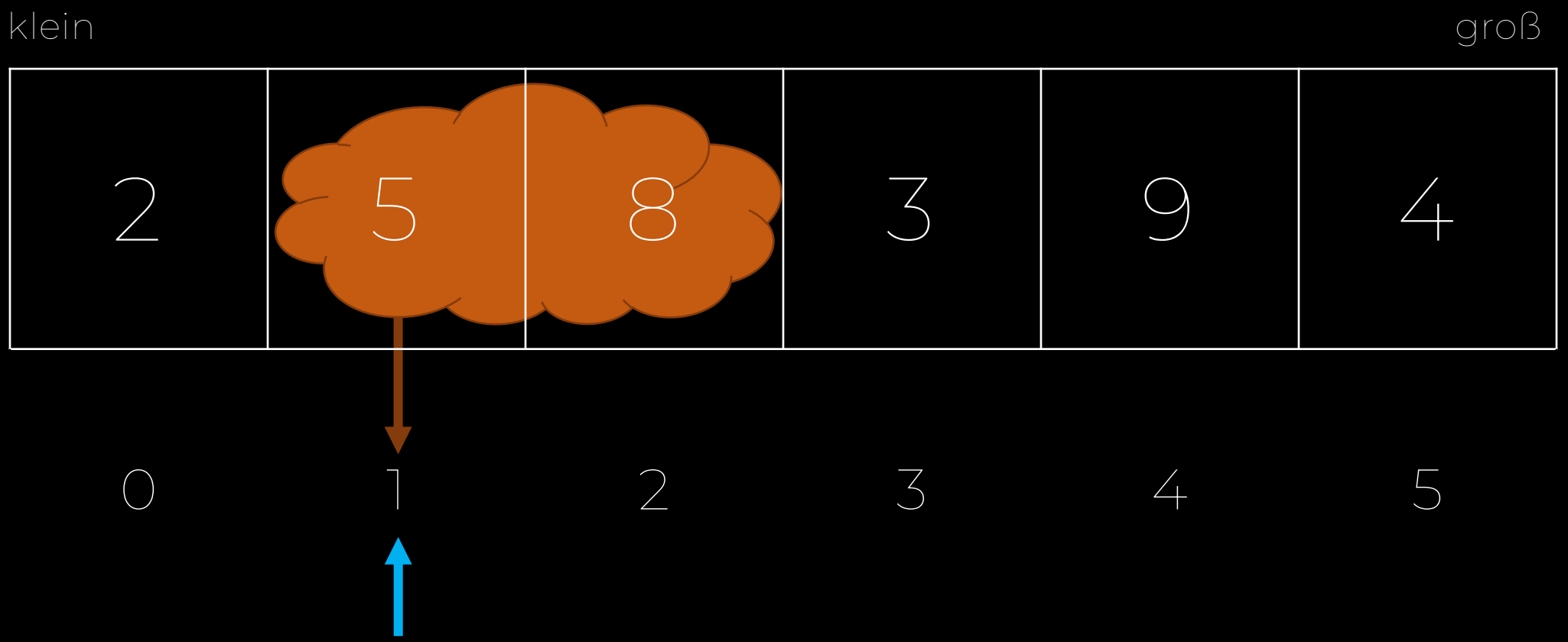
=> $O(n^2)$

Bubblesort

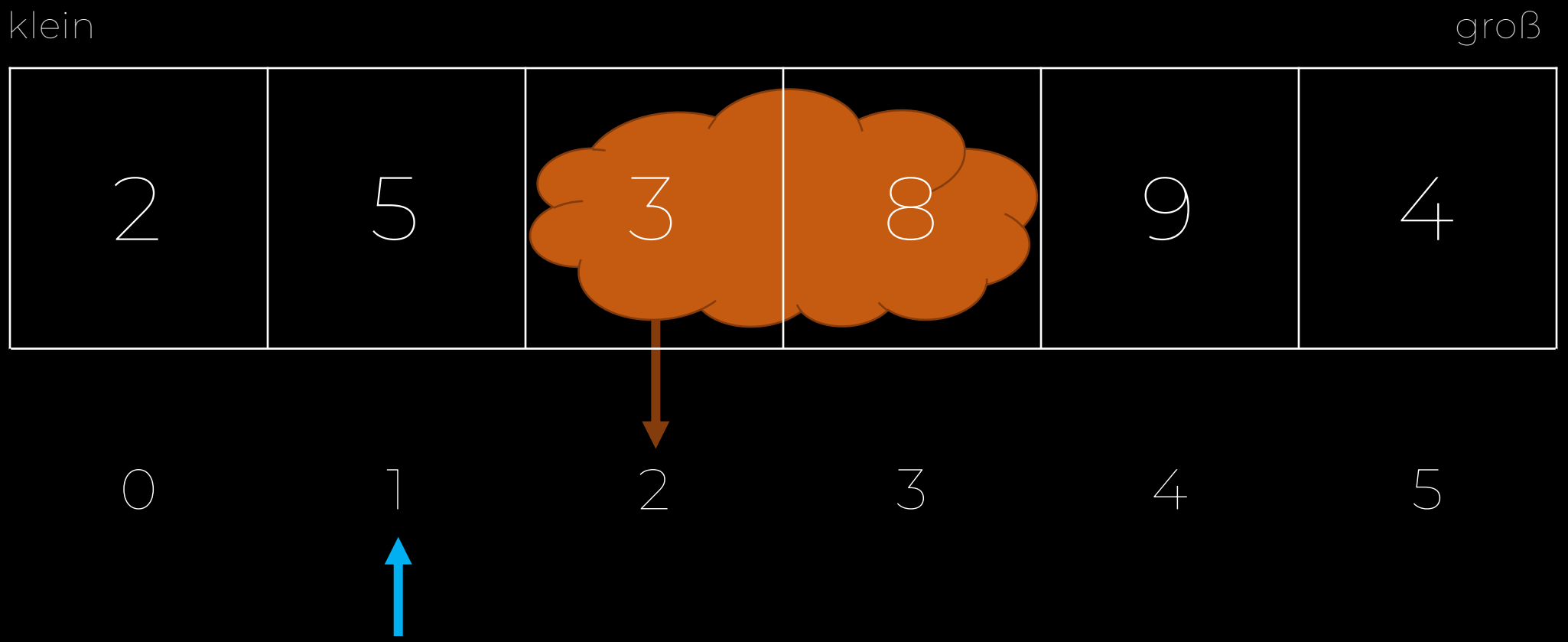
Bubblesort



Bubblesort



Bubblesort



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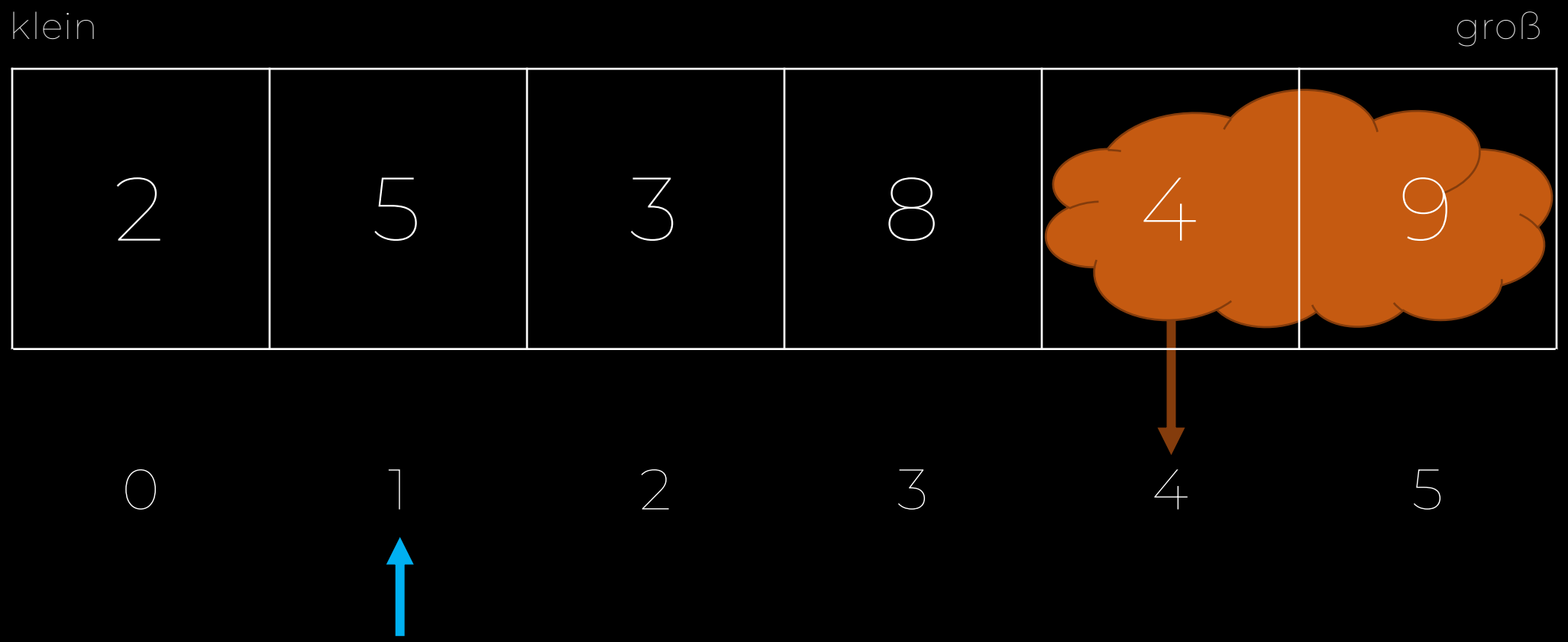
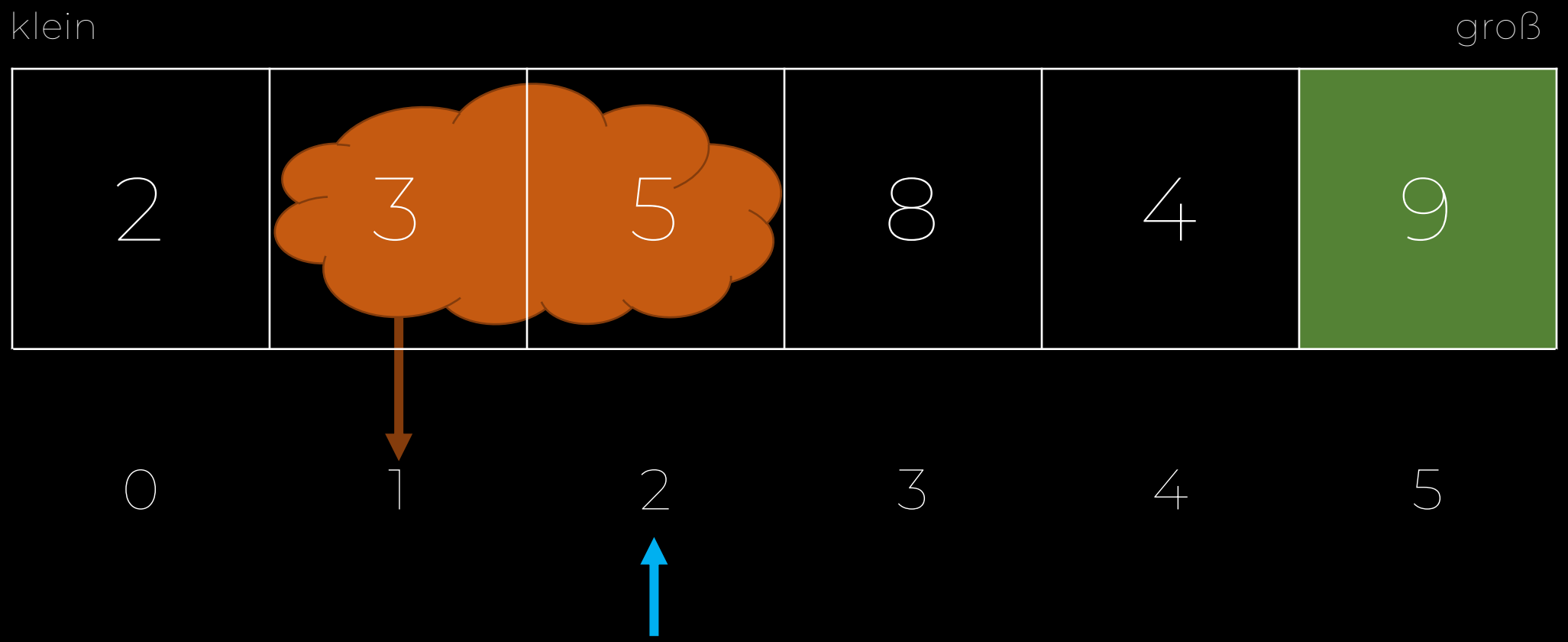


Bubblesort

Bubblesort



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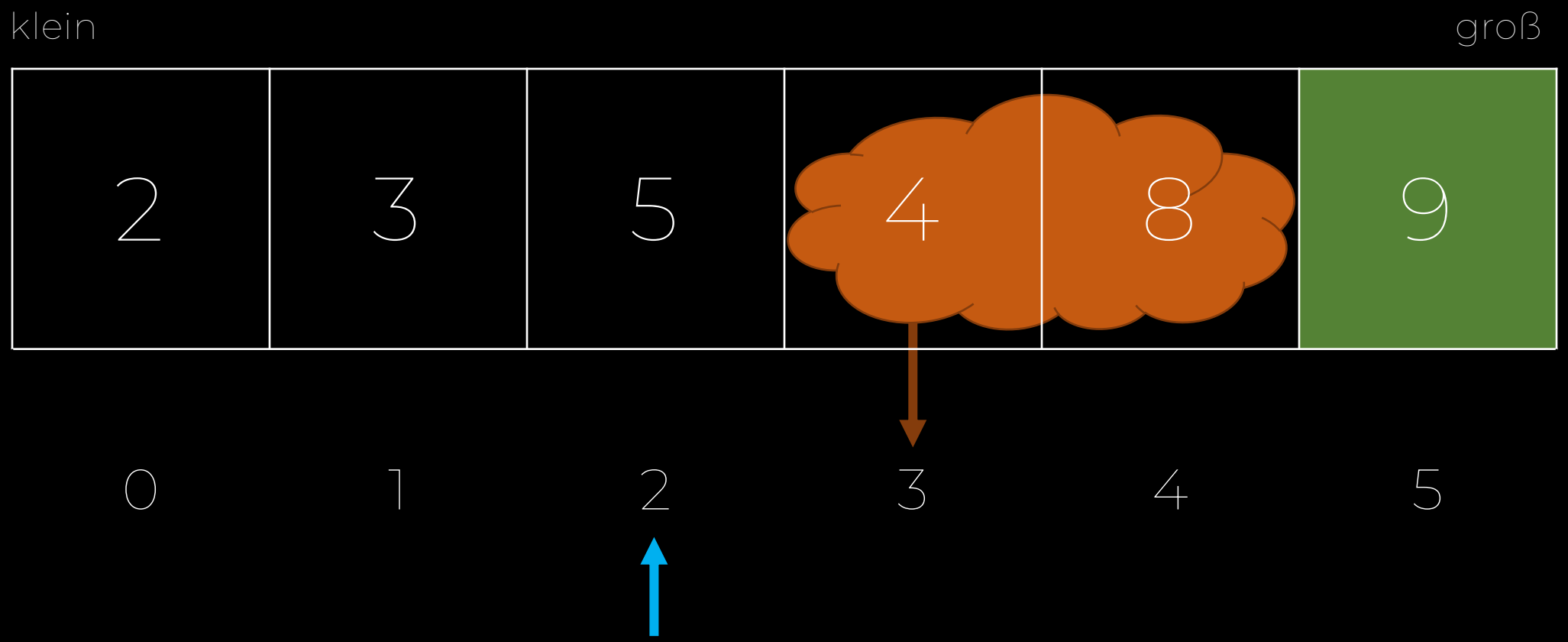
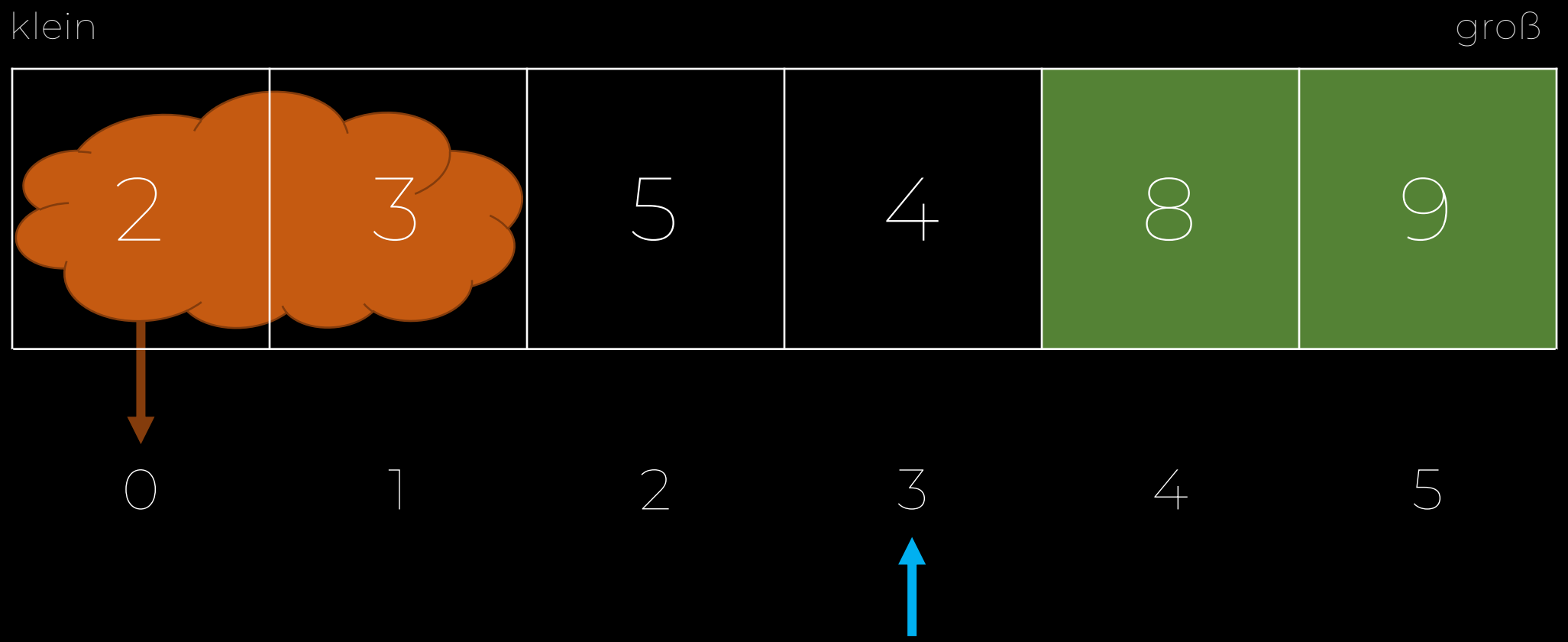
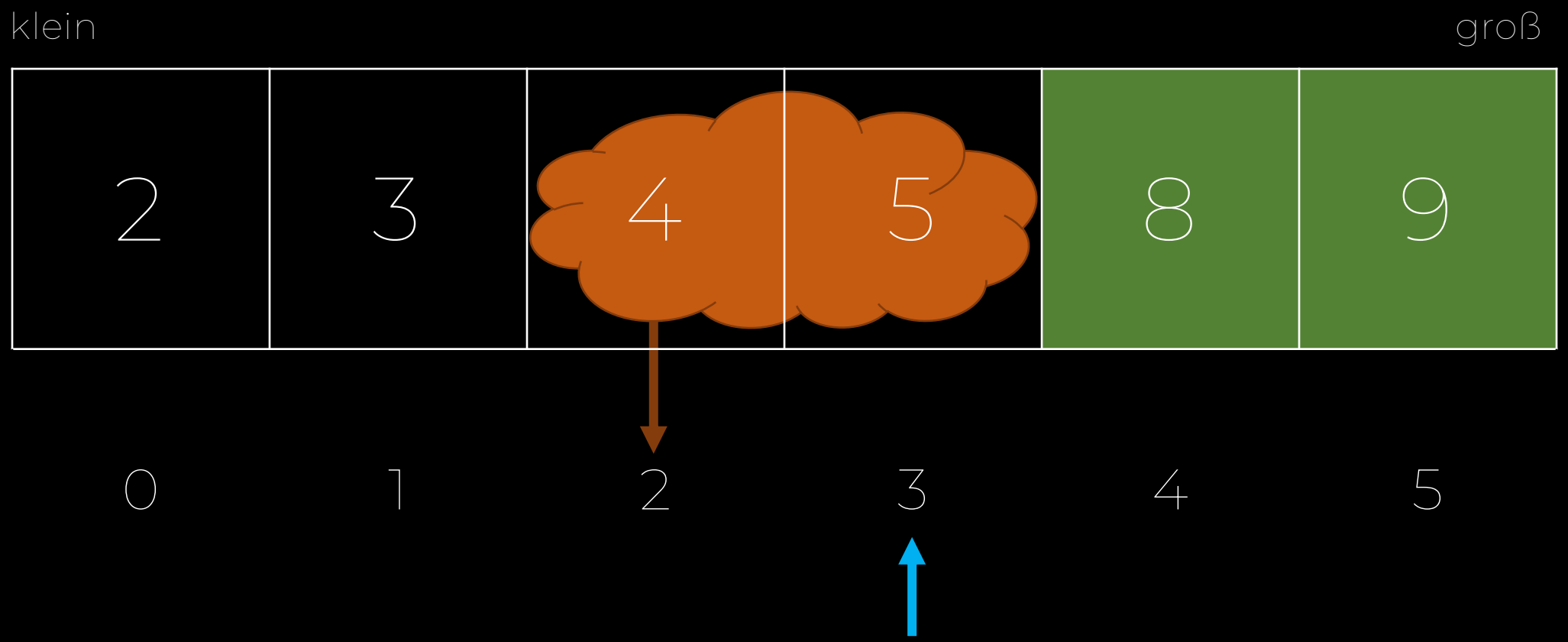


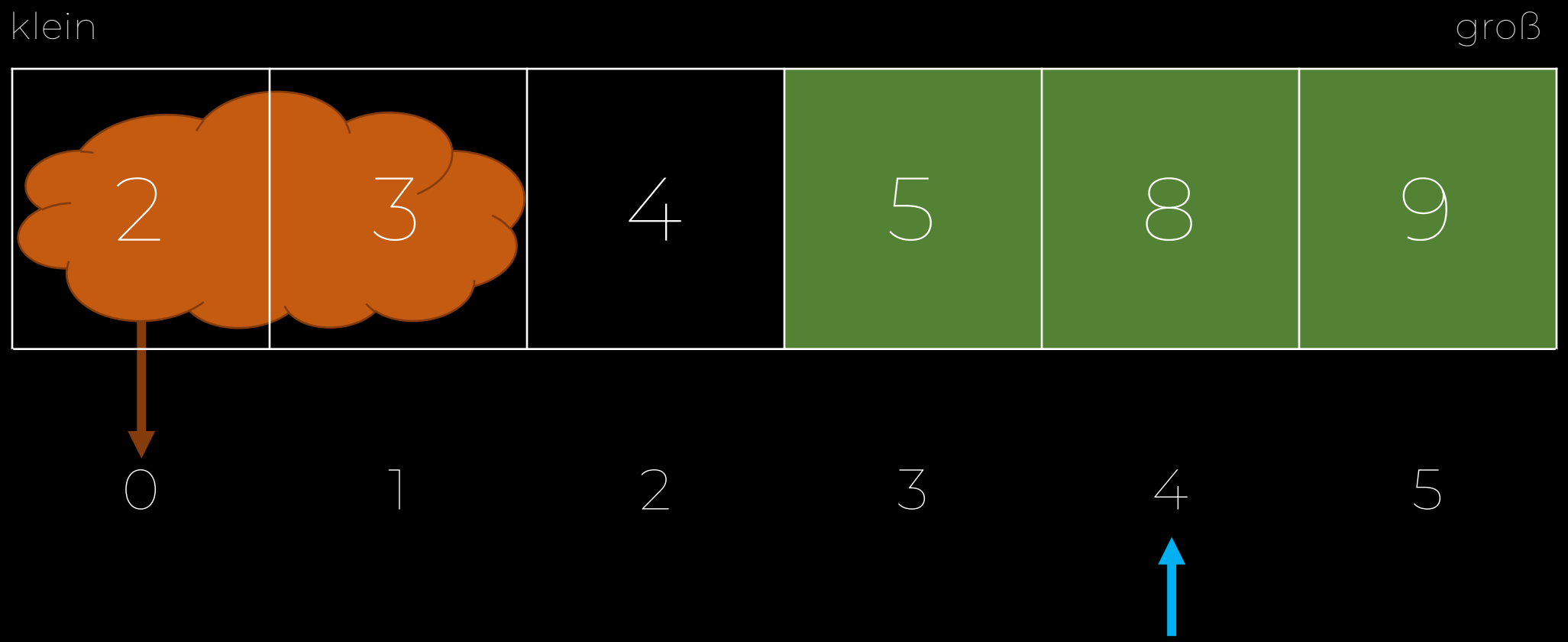
Bubblesort



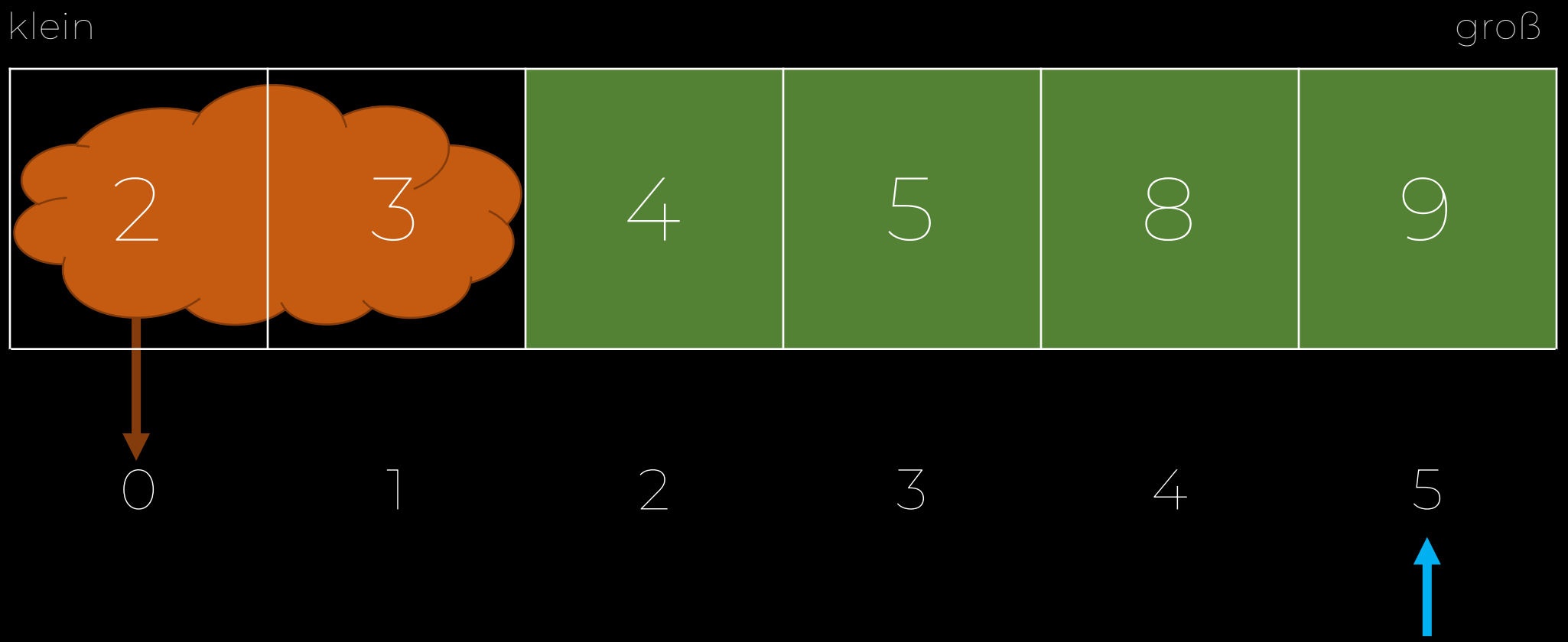
Bubblesort



Bubblesort



Bubblesort



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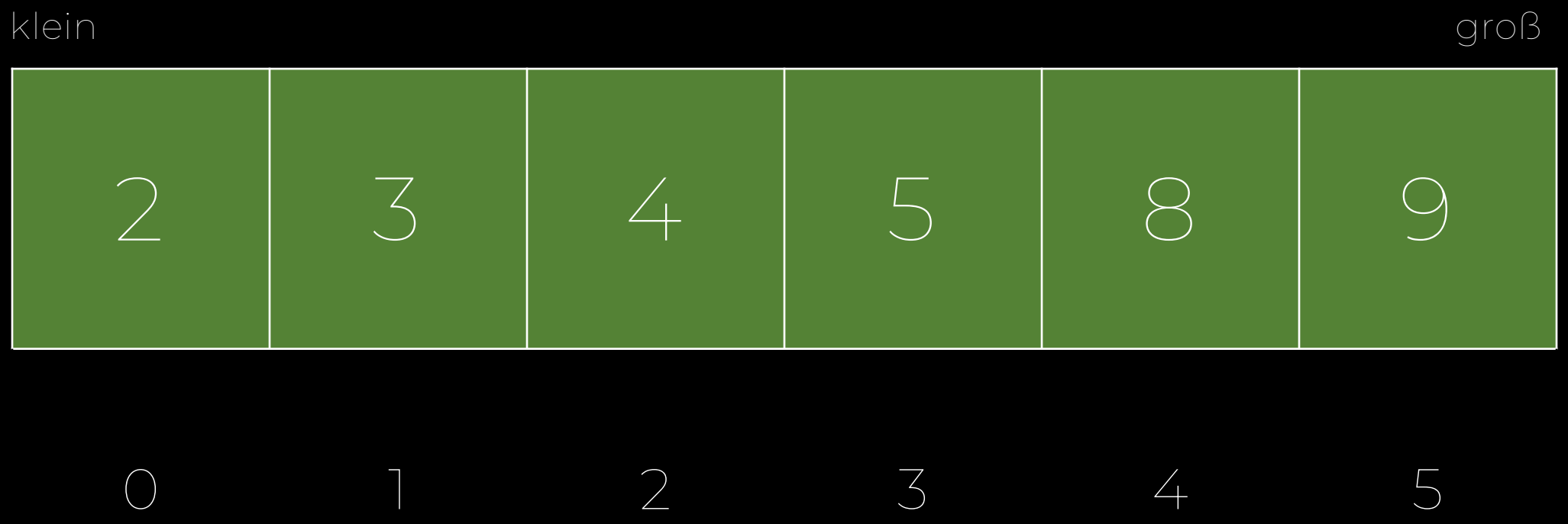


Übung 1

a) Sortiere folgenden Zahlenfolge mit dem Bubblesort:

```
5 2 4 6 1 3
```

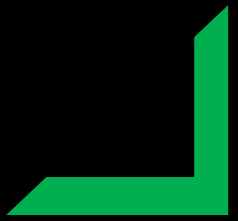
b) Erkläre den Bubblesort in deinen eigenen Worten.

c) Analysiere die Komplexität (Laufzeit) des Bubblesort.

d) Zeichne ein Struktogramm zum Bubblesort.

e) Erstelle ein Programm namens **Sortierverfahren** und implementiere folgende Funktion:

```
int[] bubbleSort(int[] unsorted)
```



Übung 1

5 2 4 6 1 3 2 4 1 3 5 6
2 5 4 6 1 3 2 1 4 3 5 6
2 4 5 6 1 3 2 1 3 4 5 6
2 4 5 6 1 3 1 2 3 4 5 6
2 4 5 1 6 3 1 2 3 4 5 6
2 4 5 1 3 6 1 2 3 4 5 6
2 4 5 1 3 6 1 2 3 4 5 6
2 4 5 1 3 6
2 4 1 5 3 6 Der Algorithmus hat 2 verschachtelte Schleifen mit je Länge n
2 4 1 3 5 6 => $O(n^2)$

Sortierverfahren.java

```java
public class Sortierverfahren {
    public static void main(String[] args) {
        int[] unsorted = {5, 2, 4, 6, 1, 3};
        int[] sorted = bubbleSort(unsorted);
        for (int i : unsorted) System.out.print(i + ", ");
        for (int i : sorted) System.out.print(i + ", ");
    }

    public static int[] bubbleSort(int[] list) {
        int tmp;
        for (int i = 1; i < list.length; i++) {
            for (int j = 0; j < list.length - i; j++) {
                if (list[j] > list[j+1]) {
                    tmp = list[j];
                    list[j] = list[j+1];
                    list[j+1] = tmp;
                }
            }
        }
        return list;
    }
}
```

Tagebucheintrag

Insertionsort

Selectionsort

Bubblesort

Wochenübung

a) Recherchiere den Sortieralgorithmus Mergesort.

b) Sortiere nach seinem Schema die Zahlenfolge:

5 2 4 6 1 3

c) Vergleiche ihn mit den bisherigen Sortverfahren hinsichtlich der Komplexität (Laufzeit).