

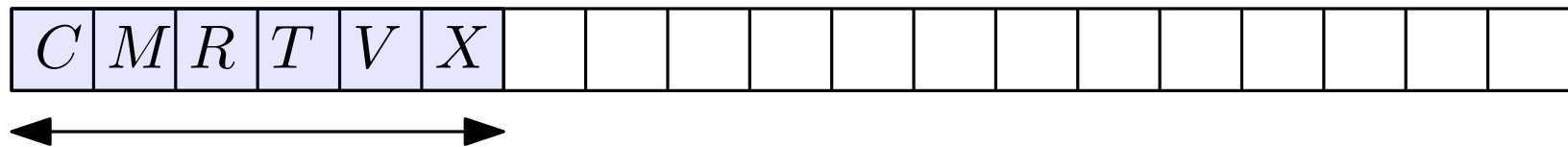
Insertion Sort

Idea, Pseudocode, Code, and Example

Insertion Sort: Idea

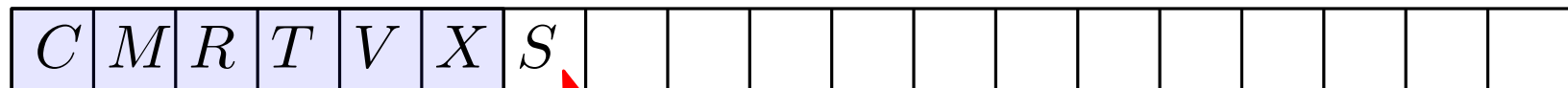


Insertion Sort: Idea



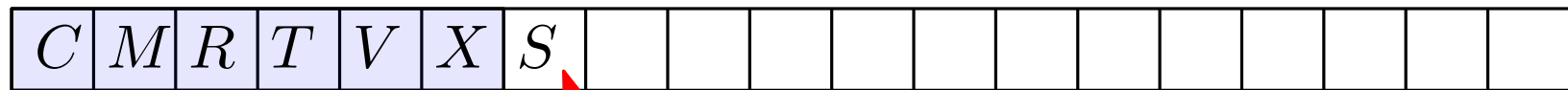
Suppose this part of the array is already sorted; for example because we have already been running InsertionSort for a while.

Insertion Sort: Idea



this is not yet at its correct position

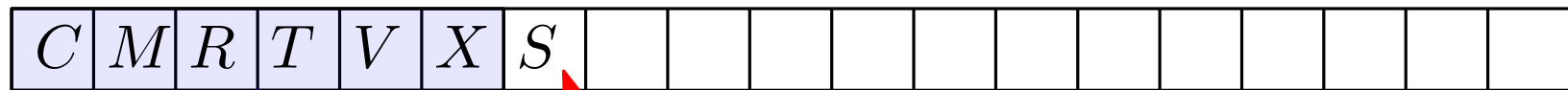
Insertion Sort: Idea



this is not yet at its correct position

correct position would be here

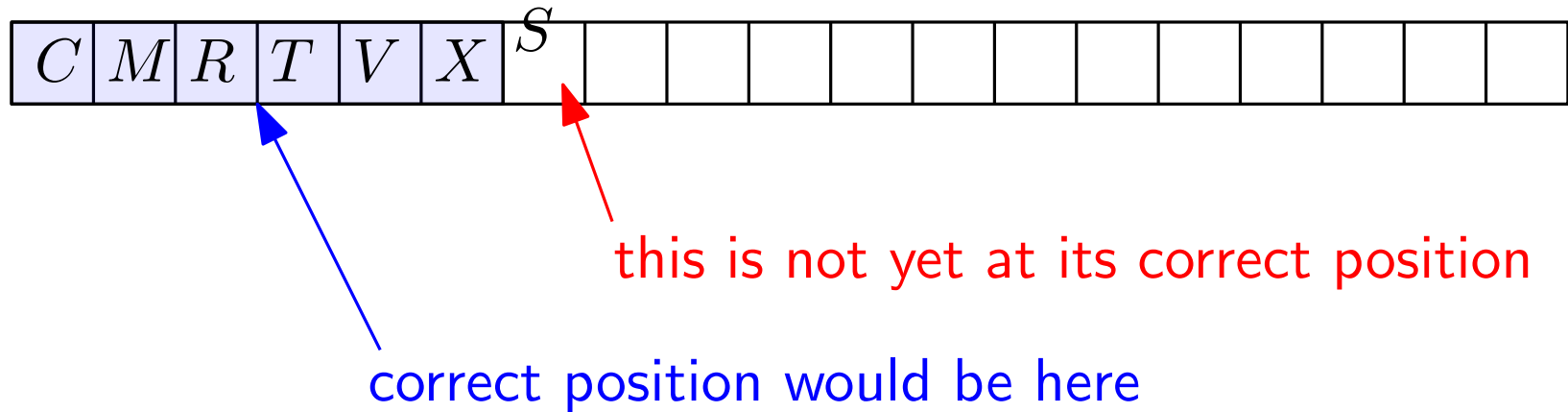
Insertion Sort: Idea



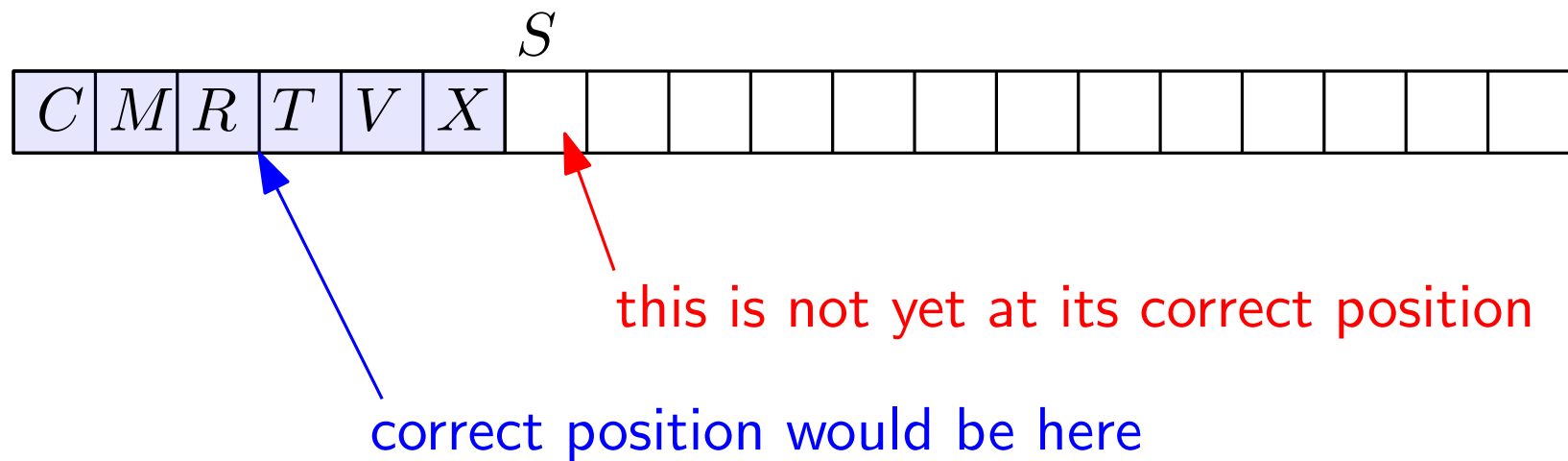
this is not yet at its correct position

correct position would be here

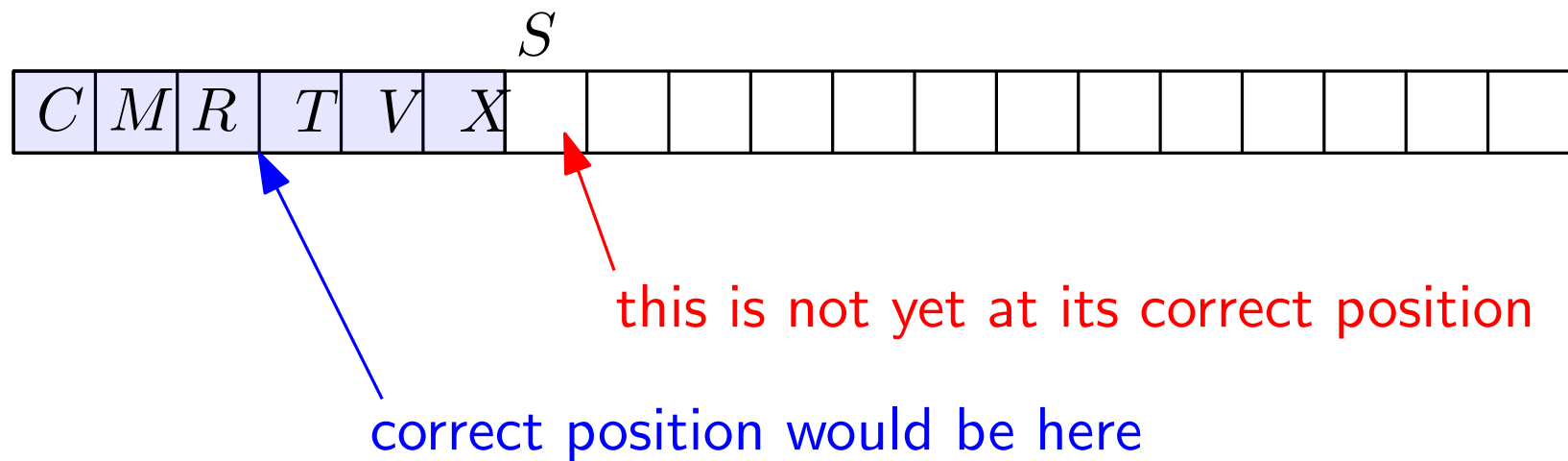
Insertion Sort: Idea



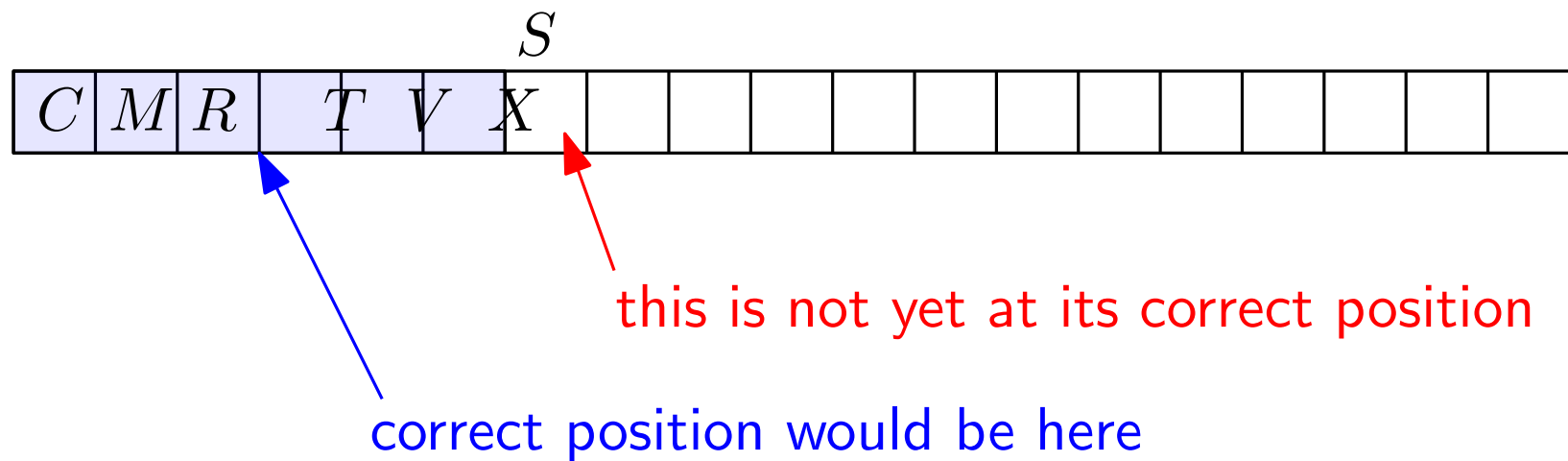
Insertion Sort: Idea



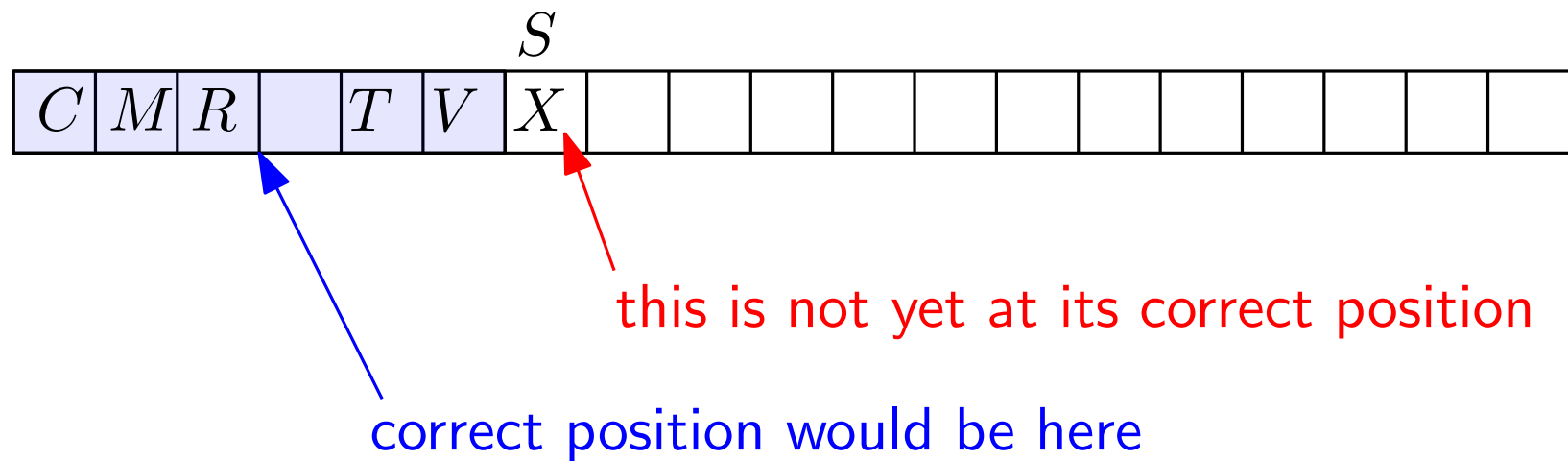
Insertion Sort: Idea



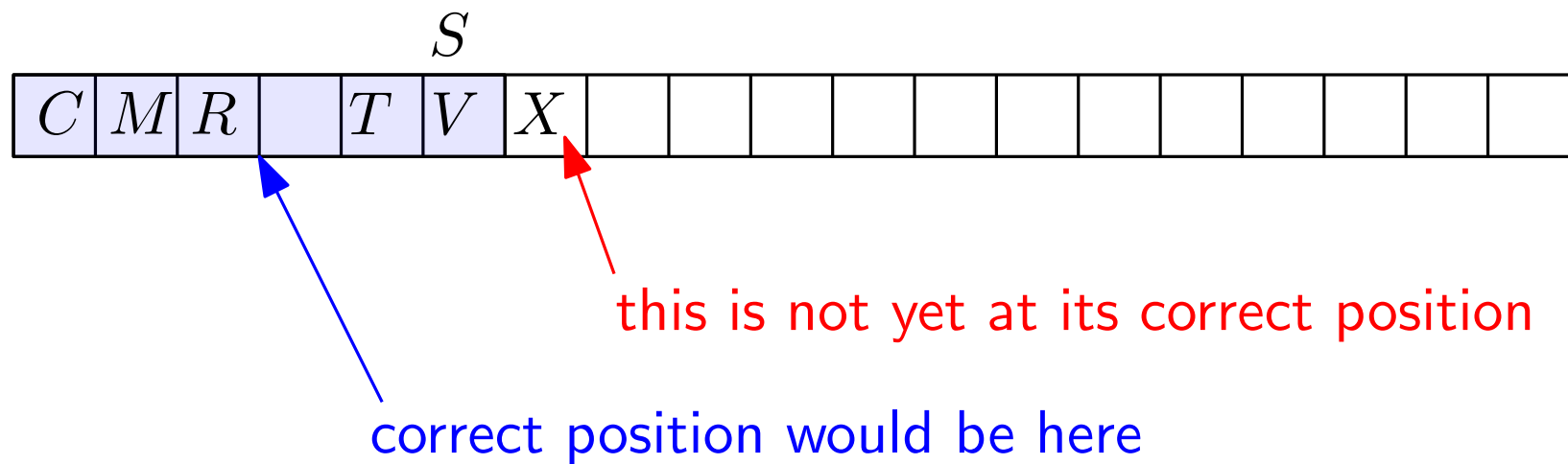
Insertion Sort: Idea



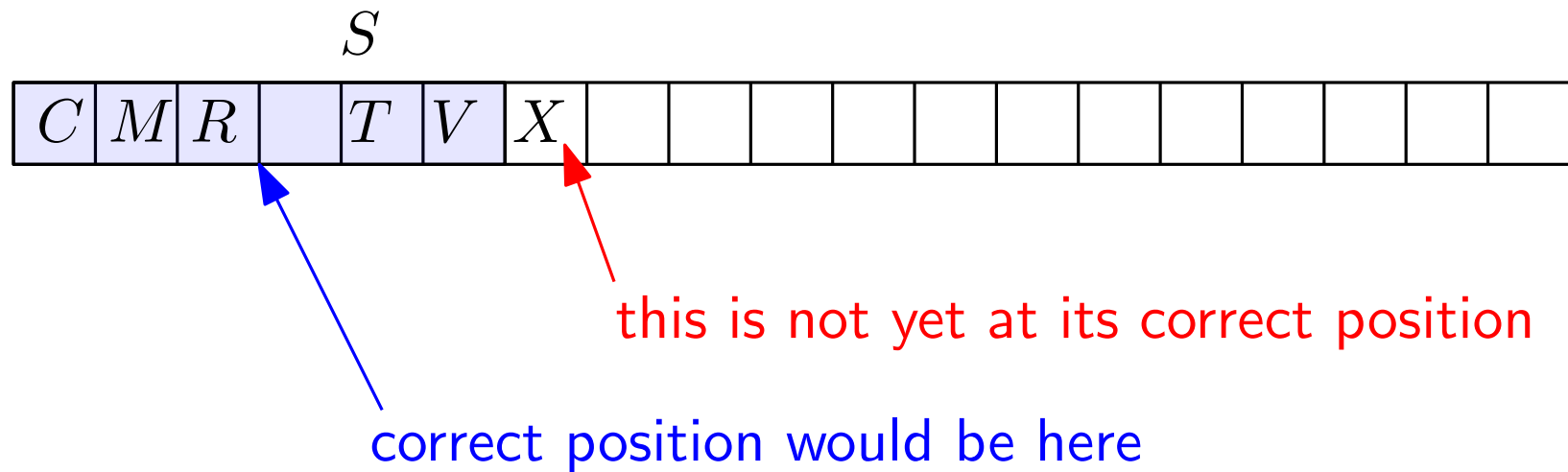
Insertion Sort: Idea



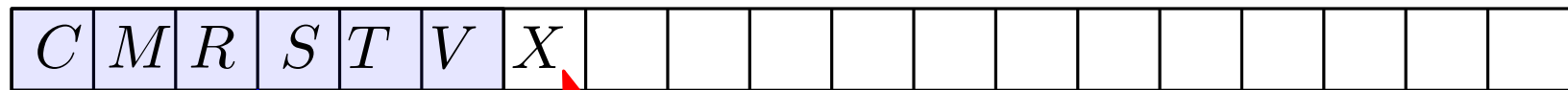
Insertion Sort: Idea



Insertion Sort: Idea



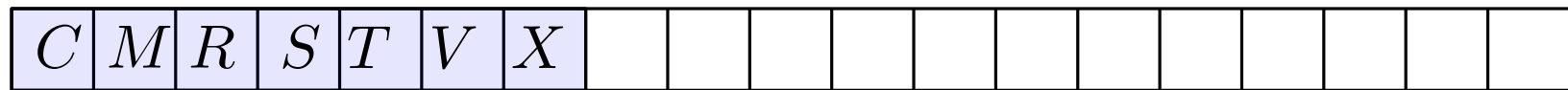
Insertion Sort: Idea



this is not yet at its correct position

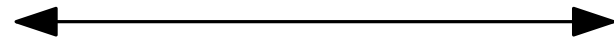
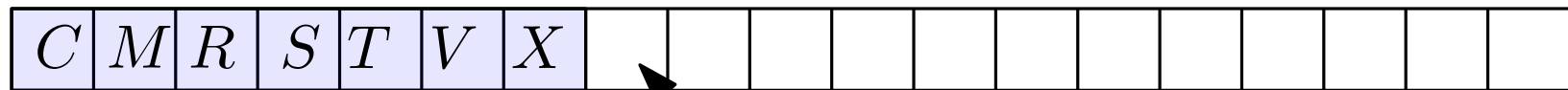
correct position would be here

Insertion Sort: Idea



now this part is already sorted

Insertion Sort: Idea



now this part is already sorted

repeat with this element

Insertion Sort: Pseudocode

1. **for** $i = 2, \dots, n$:
2. move $A[i]$ to its correct place in $A[1..i - 1]$:
3. $j = i$
4. **while** $j > 1$ and $A[j] < A[j - 1]$:
5. exchange $A[j - 1]$ and $A[j]$
6. $j := j - 1$

Selection Sort: java code

```
for (int i=1; i<n; i++) {  
    int j = i;  
    while (j > 0 && array[j].compareTo(array[j-1]) < 0) {  
        String temp = array[j];  
        array[j] = array[j-1];  
        array[j-1] = temp;  
        j = j-1;  
    }  
}
```

<i>J</i>	<i>V</i>	<i>E</i>	<i>D</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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<i>J</i>	<i>V</i>	<i>E</i>	<i>D</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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This part is already sorted in itself

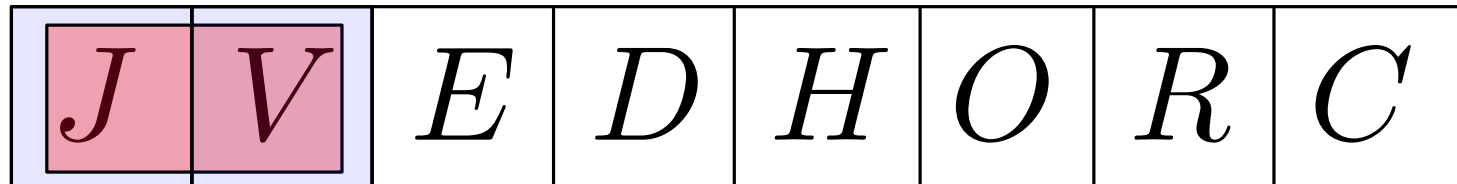
Is this pair correctly sorted?

<i>J</i>	<i>V</i>	<i>E</i>	<i>D</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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This part is already sorted in itself

Is this pair correctly sorted?

Yes. So extend the blue box.



This part is already sorted in itself

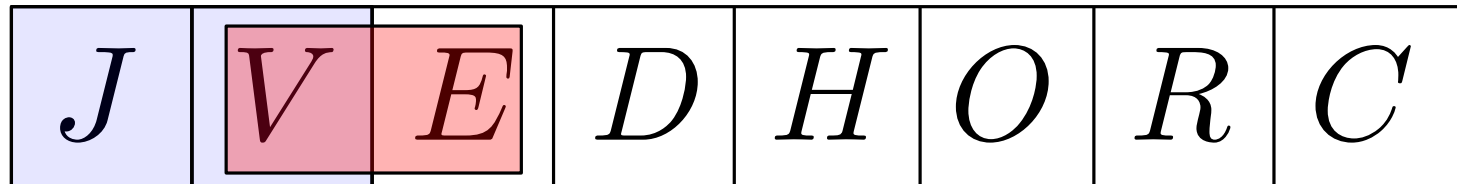
<i>J</i>	<i>V</i>	<i>E</i>	<i>D</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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This part is already sorted in itself

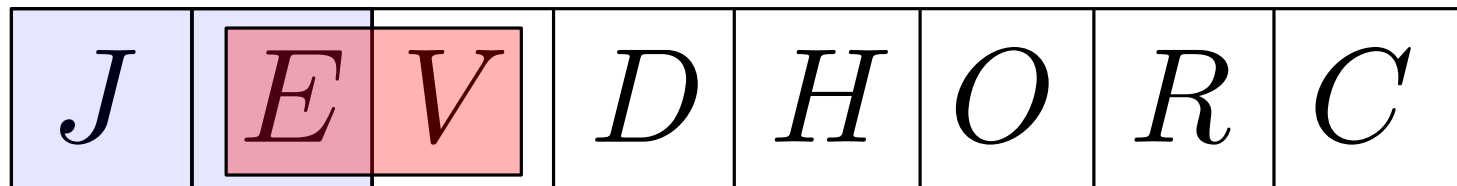
<i>J</i>	<i>V</i>	<i>E</i>	<i>D</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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This part is already sorted in itself

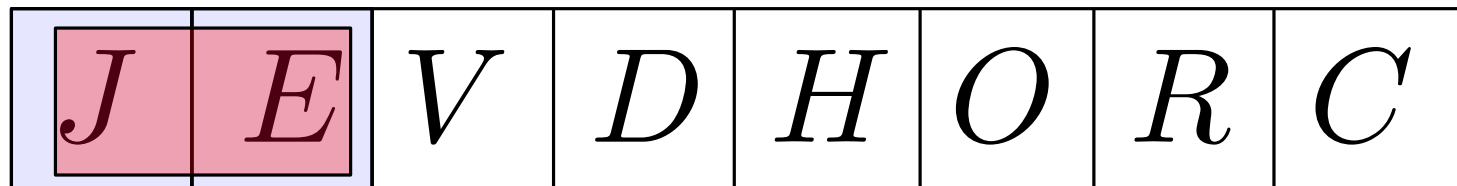
swap them



This part is already sorted in itself

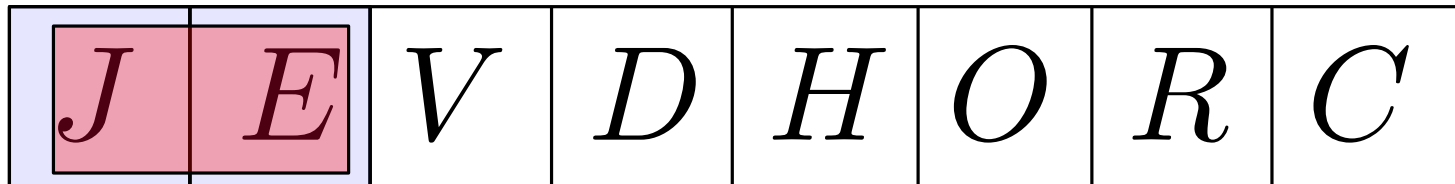


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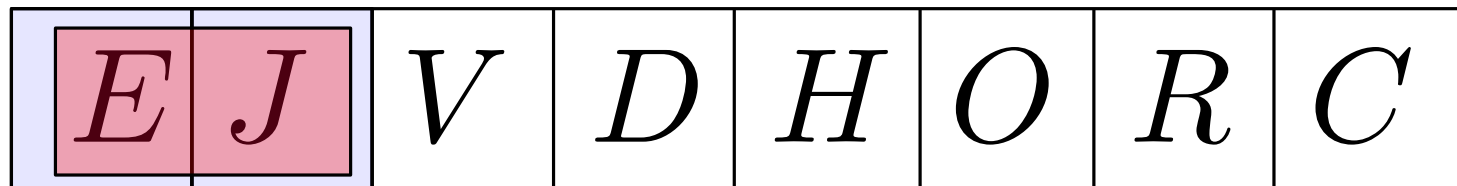


This part is already sorted in itself

swap them



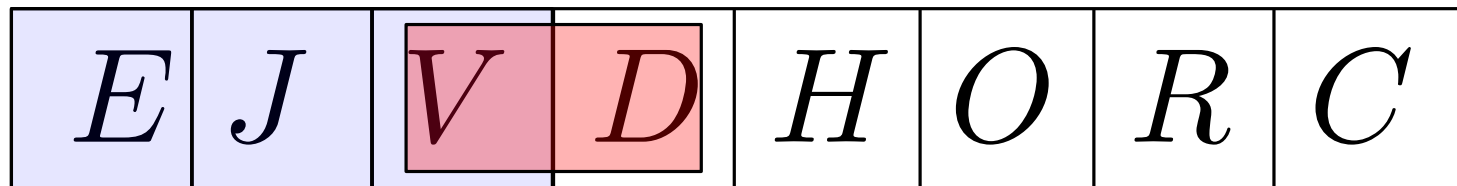
This part is already sorted in itself



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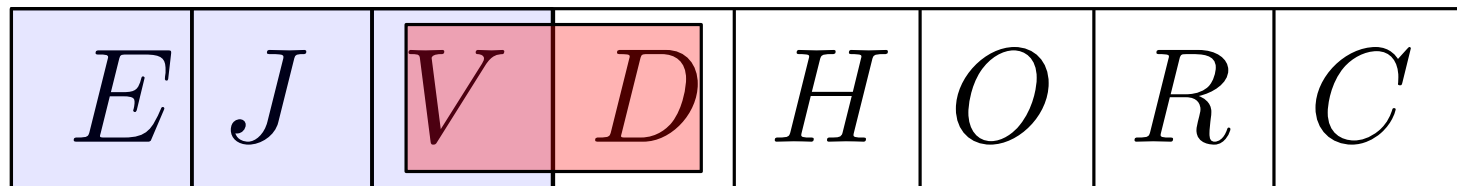
<i>E</i>	<i>J</i>	<i>V</i>	<i>D</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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This part is already sorted in itself

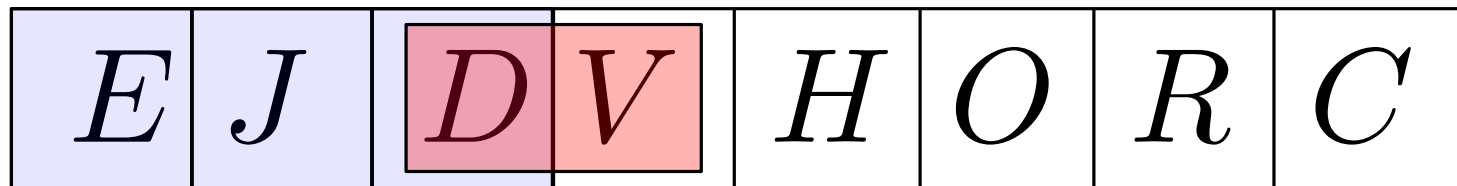


This part is already sorted in itself

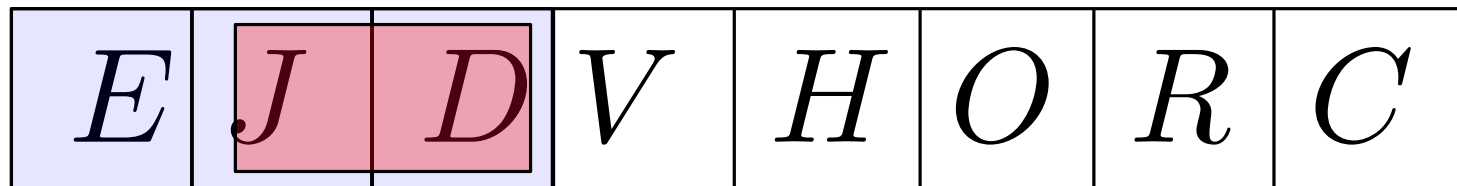
swap them



This part is already sorted in itself

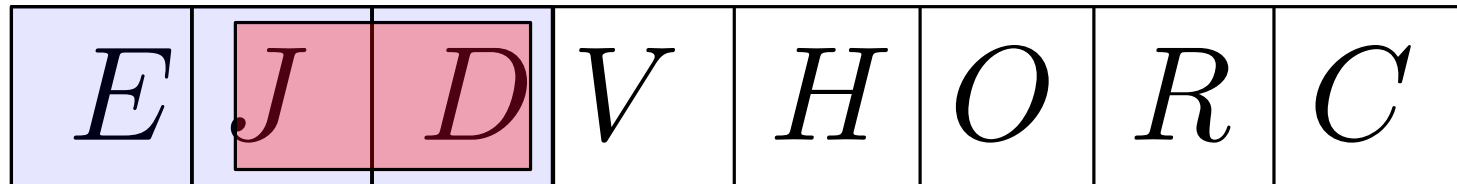


This part is already sorted in itself

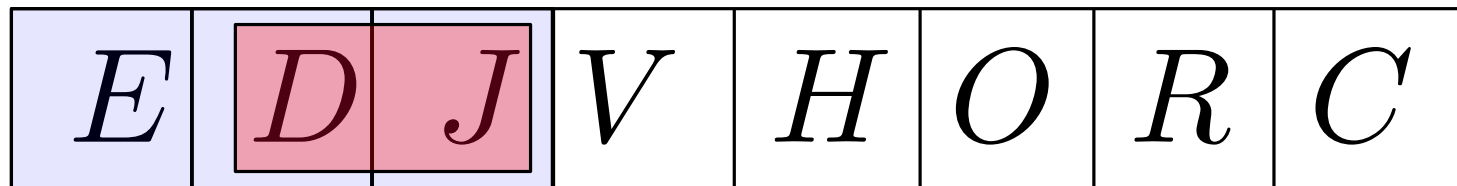


This part is already sorted in itself

swap them



This part is already sorted in itself

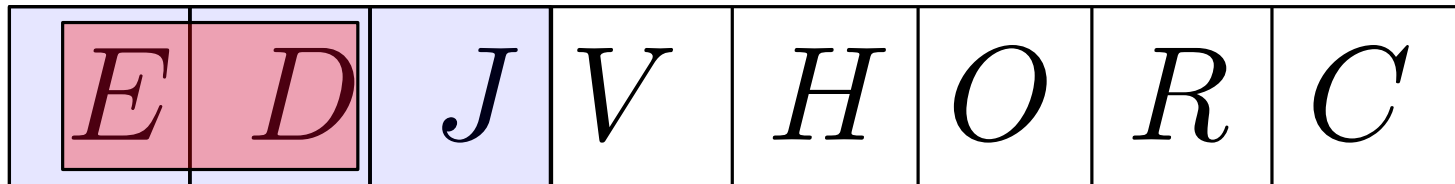


This part is already sorted in itself

<i>E</i>	<i>D</i>	<i>J</i>	<i>V</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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swap them



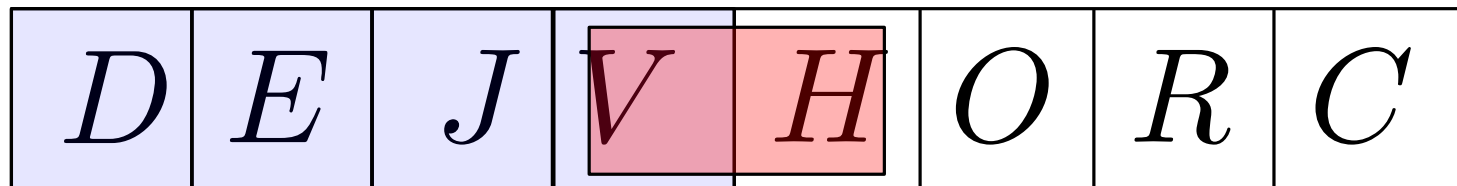
This part is already sorted in itself

	<i>D</i>	<i>E</i>	<i>J</i>	<i>V</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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This part is already sorted in itself

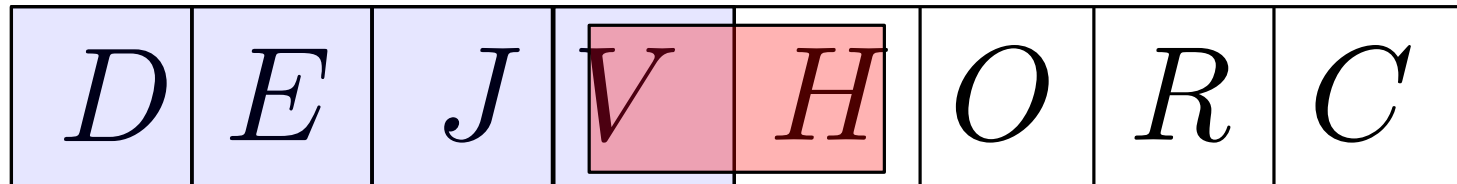
<i>D</i>	<i>E</i>	<i>J</i>	<i>V</i>	<i>H</i>	<i>O</i>	<i>R</i>	<i>C</i>
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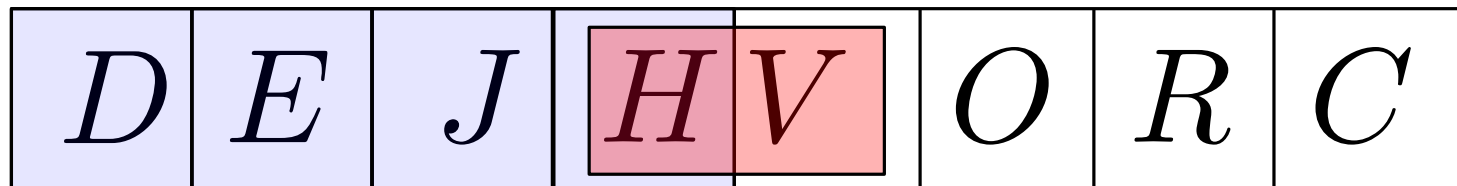


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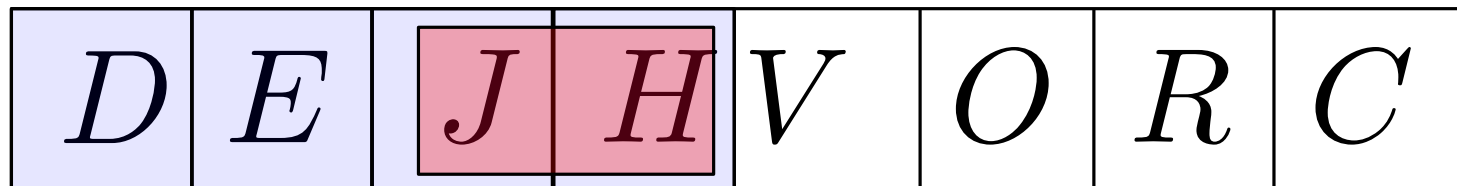
swap them



This part is already sorted in itself

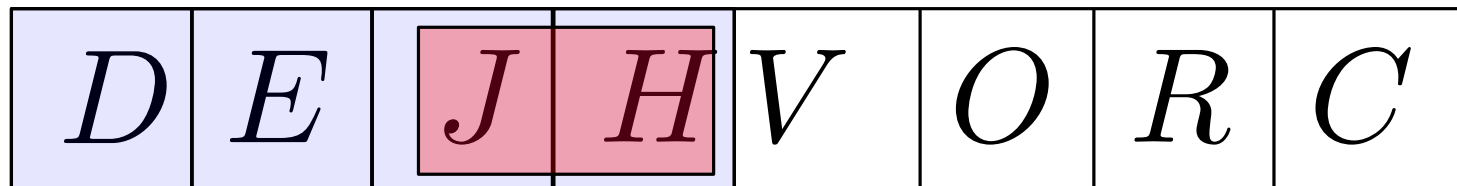


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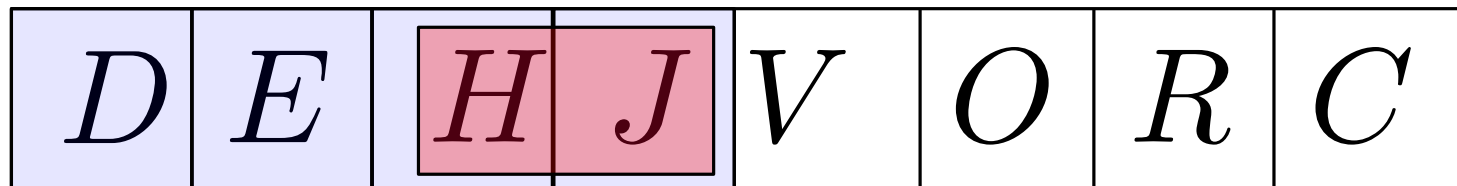


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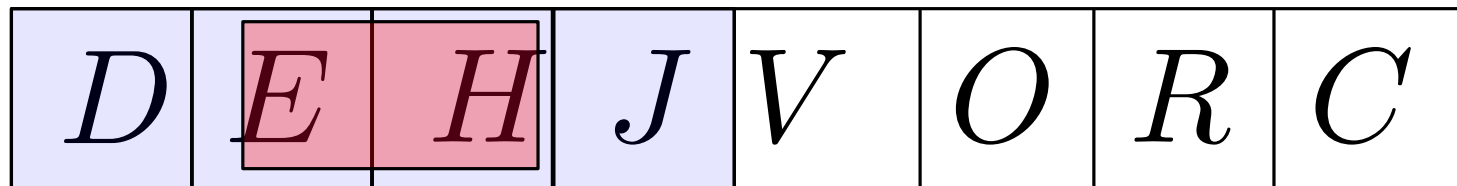
swap them



This part is already sorted in itself

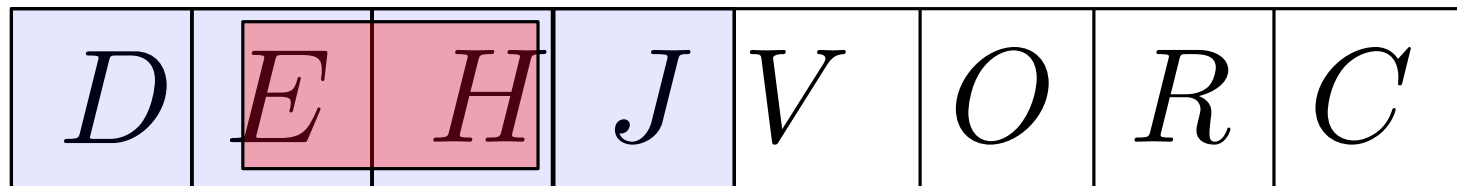


This part is already sorted in itself



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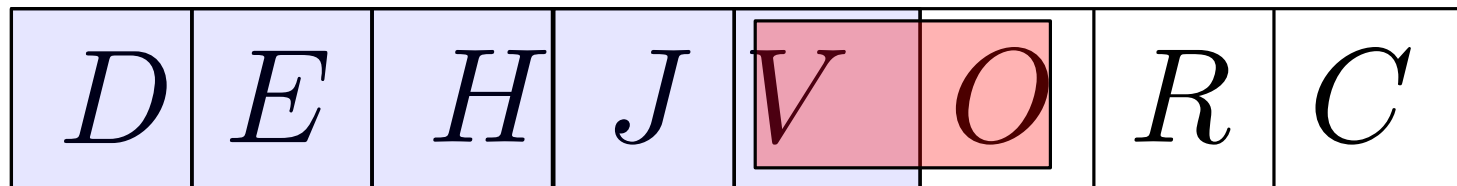
already okay



This part is already sorted in itself

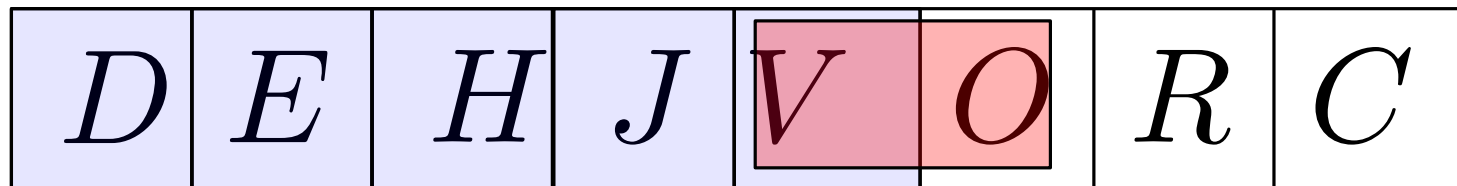
<i>D</i>	<i>E</i>	<i>H</i>	<i>J</i>	<i>V</i>	<i>O</i>	<i>R</i>	<i>C</i>
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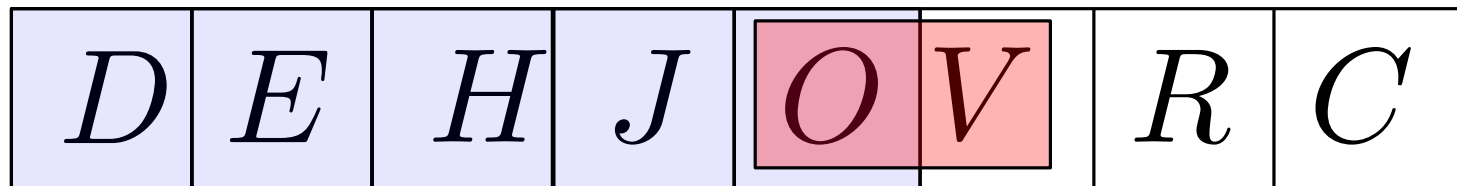


This part is already sorted in itself

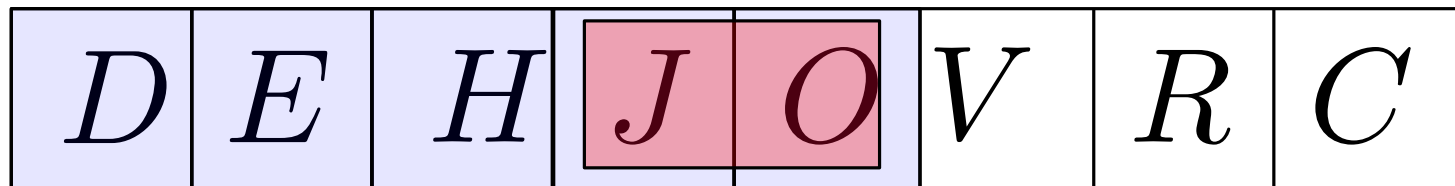
swap them



This part is already sorted in itself

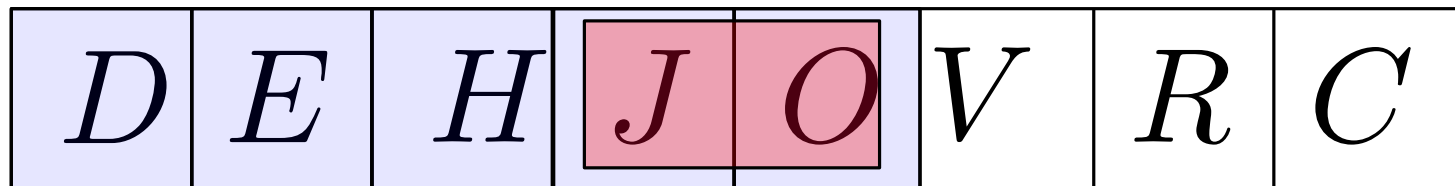


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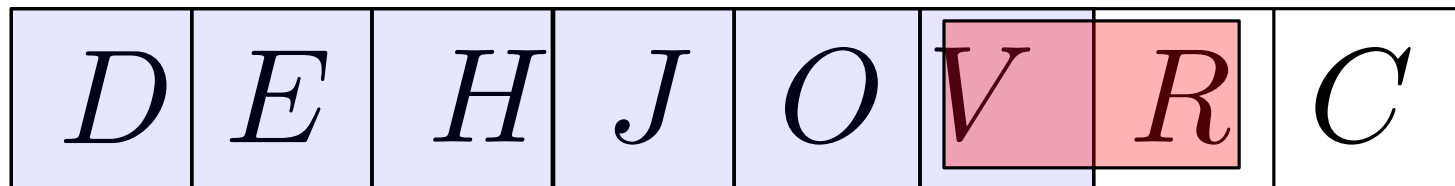
already okay



This part is already sorted in itself

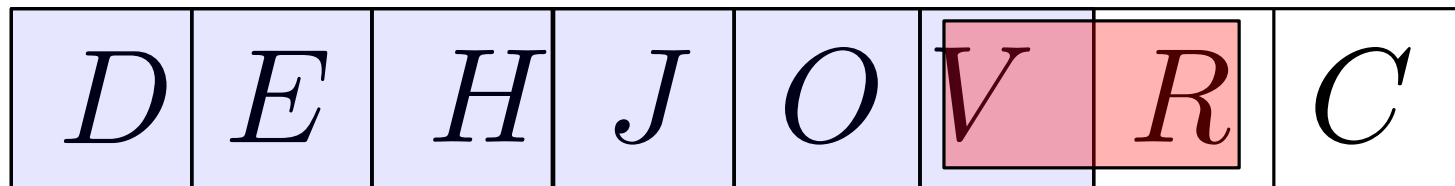
<i>D</i>	<i>E</i>	<i>H</i>	<i>J</i>	<i>O</i>	<i>V</i>	<i>R</i>	<i>C</i>
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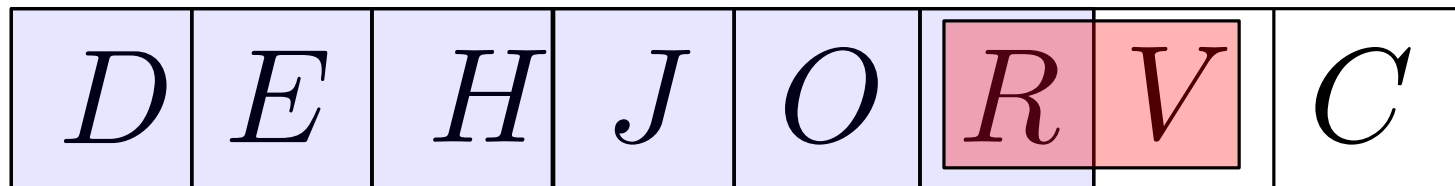


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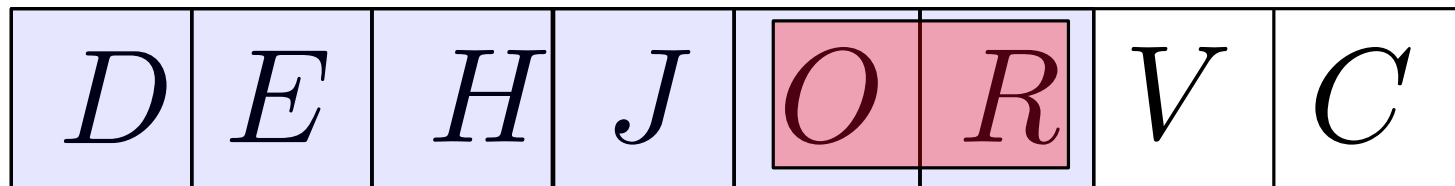
swap them



This part is already sorted in itself

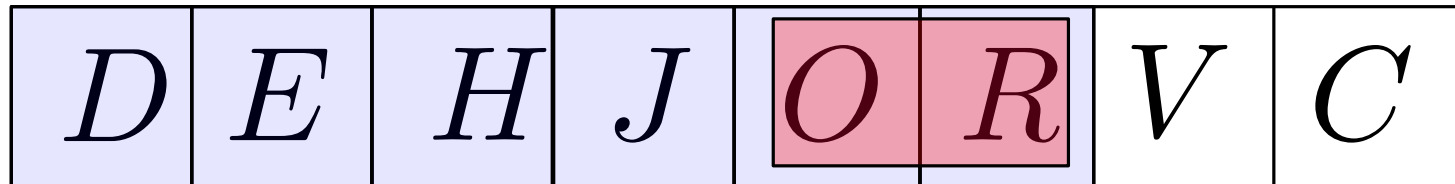


This part is already sorted in itself



This part is already sorted in itself

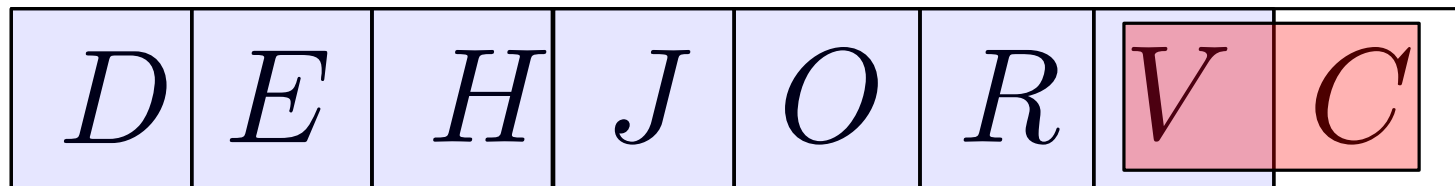
already okay



This part is already sorted in itself

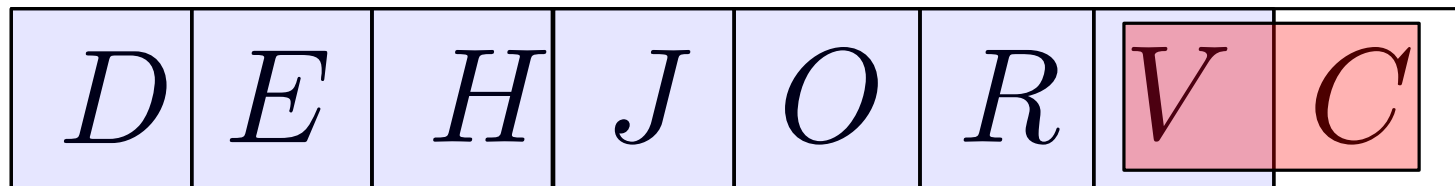
<i>D</i>	<i>E</i>	<i>H</i>	<i>J</i>	<i>O</i>	<i>R</i>	<i>V</i>	<i>C</i>
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This part is already sorted in itself

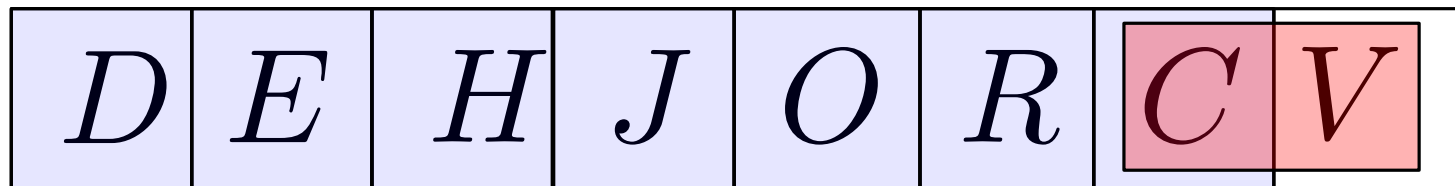


This part is already sorted in itself

exchange them

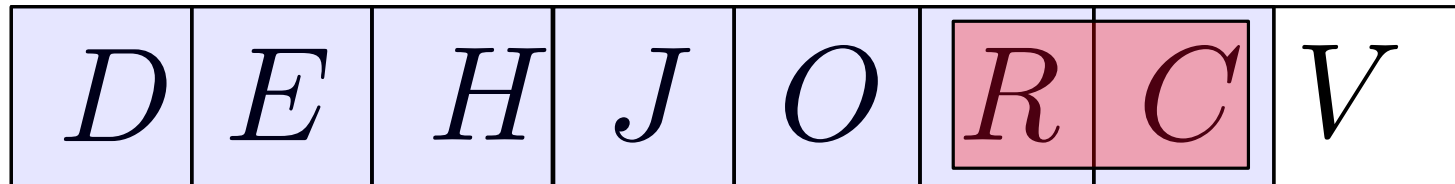


This part is already sorted in itself

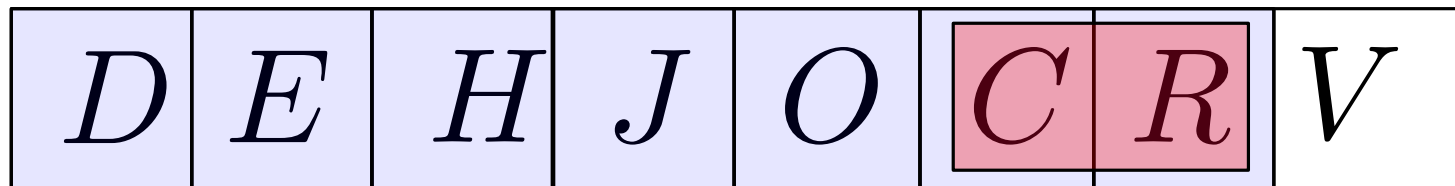


This part is already sorted in itself

exchange them

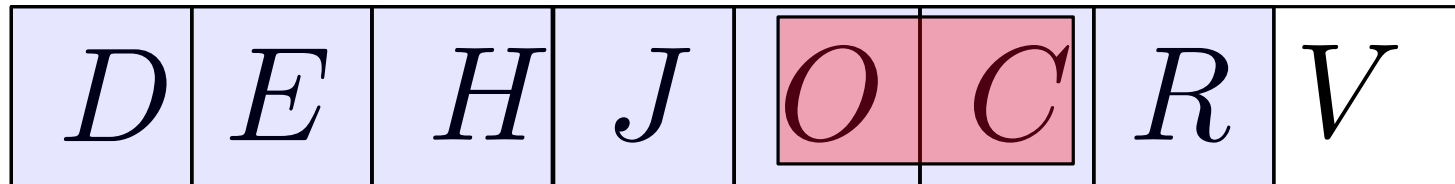


This part is already sorted in itself

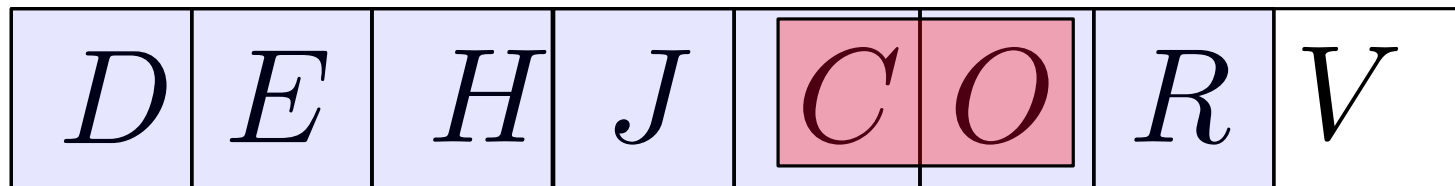


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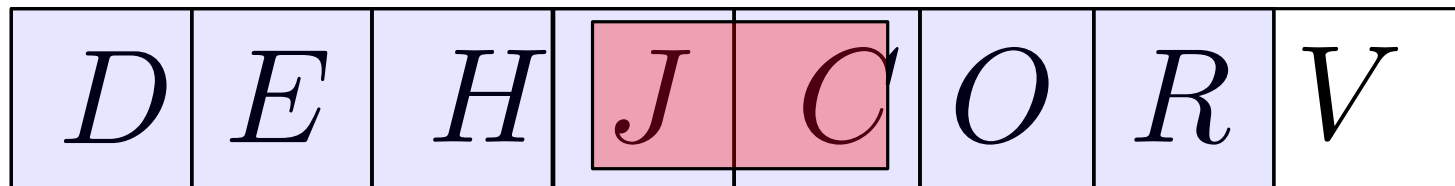


This part is already sorted in itself

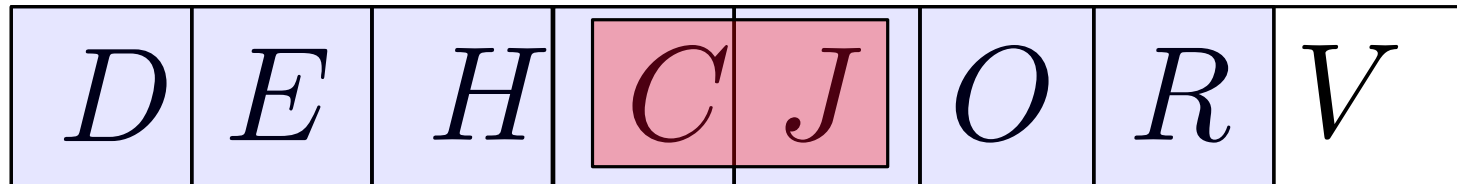


This part is already sorted in itself

exchange them

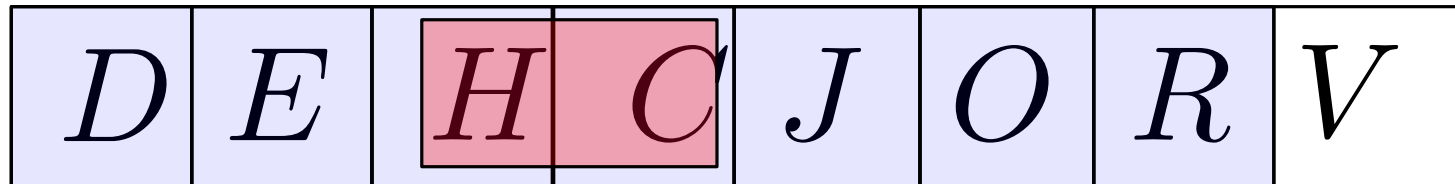


This part is already sorted in itself

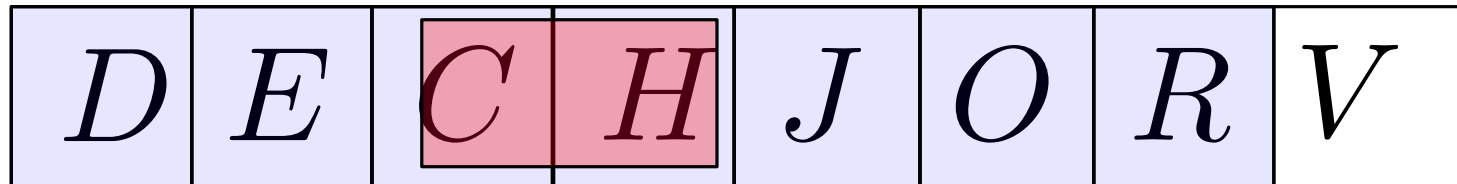


This part is already sorted in itself

exchange them

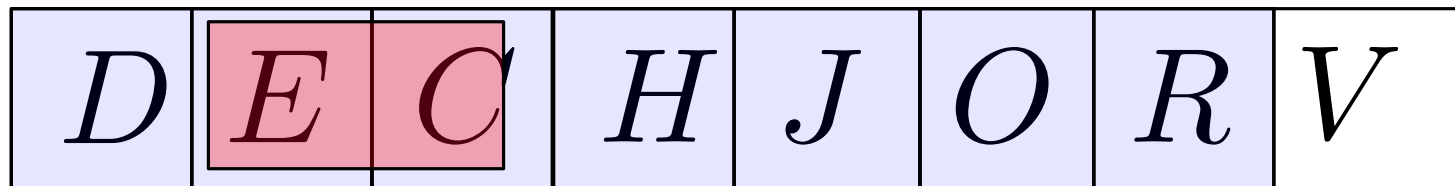


This part is already sorted in itself

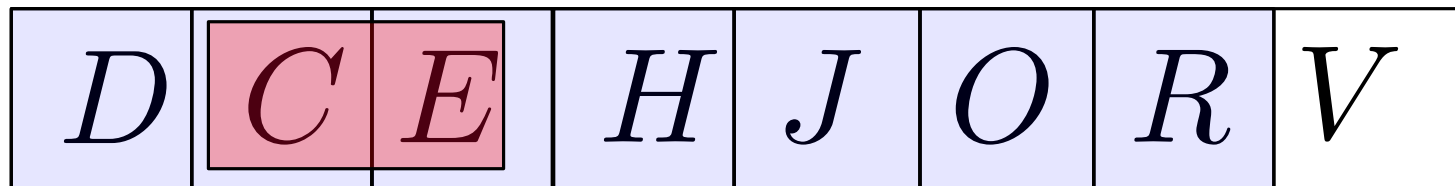


This part is already sorted in itself

exchange them

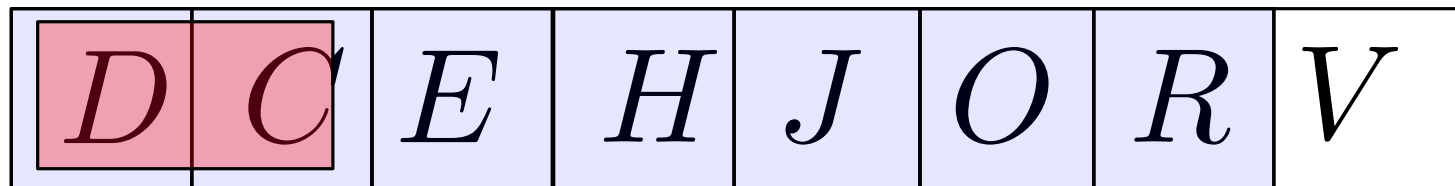


This part is already sorted in itself



This part is already sorted in itself

exchange them



This part is already sorted in itself

<i>C</i>	<i>D</i>	<i>E</i>	<i>H</i>	<i>J</i>	<i>O</i>	<i>R</i>	<i>V</i>
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This part is already sorted in itself

<i>C</i>	<i>D</i>	<i>E</i>	<i>H</i>	<i>J</i>	<i>O</i>	<i>R</i>	<i>V</i>
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This part is already sorted in itself