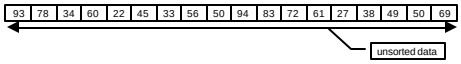
Algonquin College

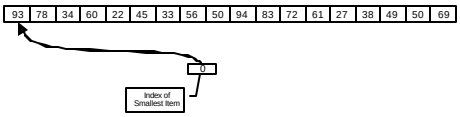
Selection Sort

Created by Rex Woollard

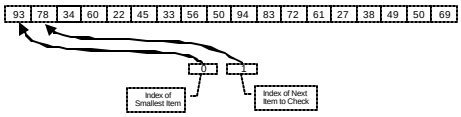
Selection Sort: Overview



Details: Pass 1a



Details: Pass 1b



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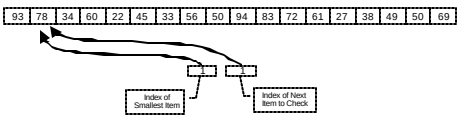
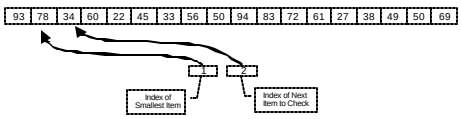


Details: Pass 1d



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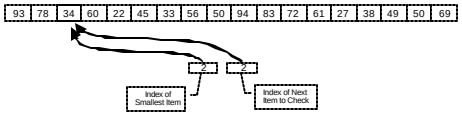

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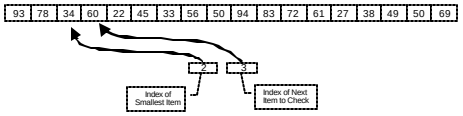

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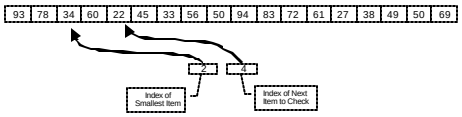

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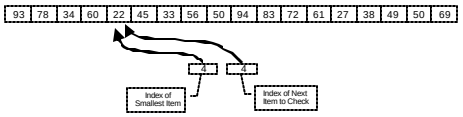
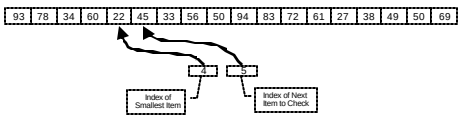
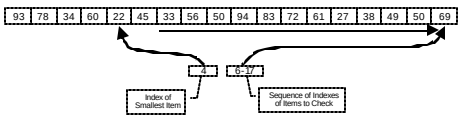


Details: Pass 1i



Details: Pass 1j



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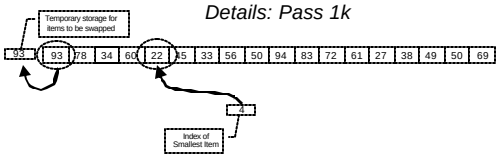
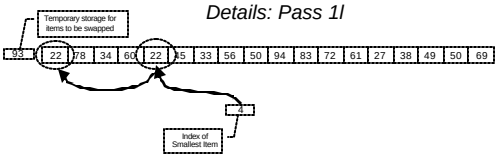


Details: Pass 1l



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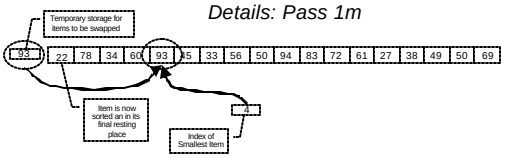

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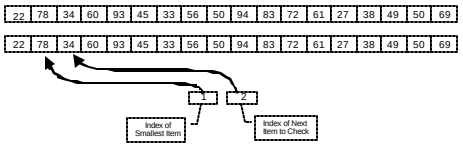

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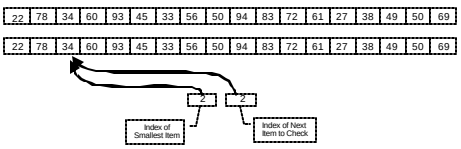

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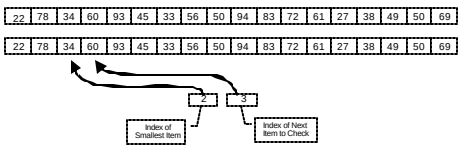

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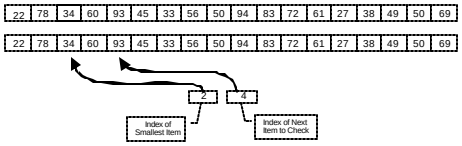

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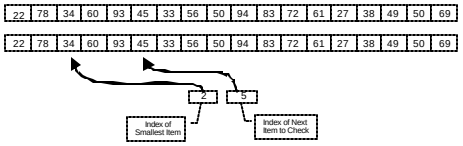
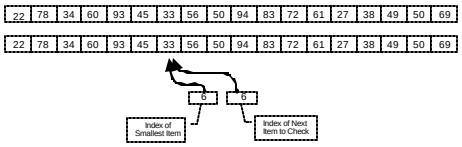


Details: Pass 2f



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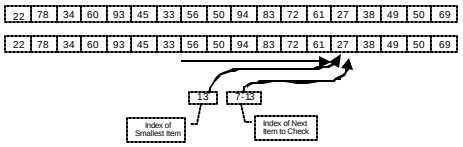
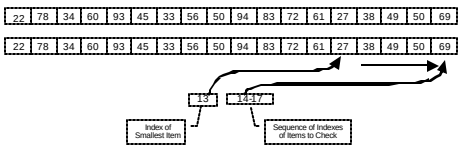
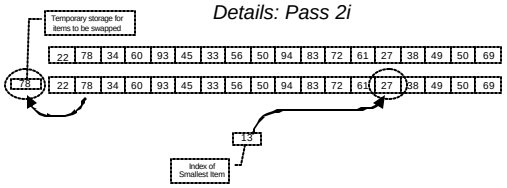


Details: Pass 2h



Details: Pass 2i



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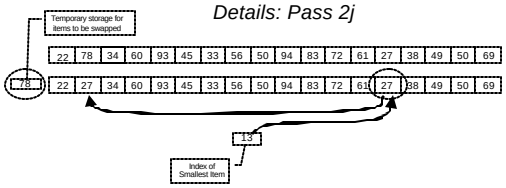

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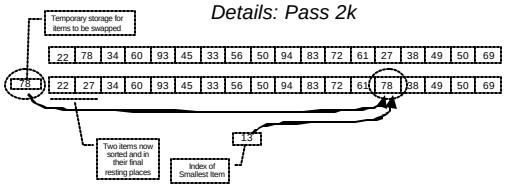
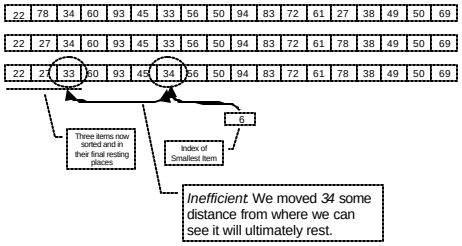


Summary: Pass 3



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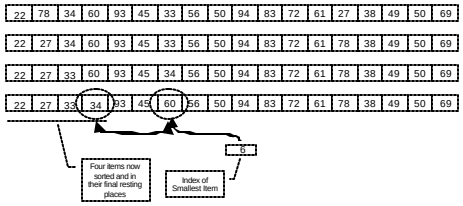

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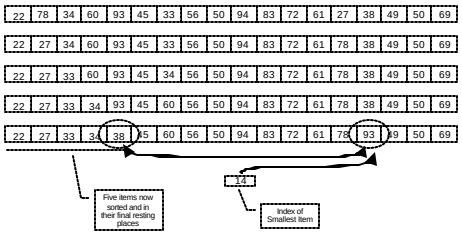
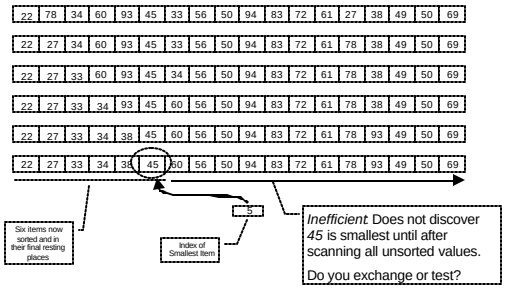


Summary: Pass 6



Algorithm Essentials

Conceptually, the list is divided into a sorted and unsorted side. Search the unsorted side for the smallest item. Move it to the sorted side.

Initial state: The list is entirely unsorted.

Outer Loop

- Manages the boundary between the sorted and unsorted.
- Arbitrarily, the first item in unsorted side is identified as the smallest item (so far). You identify the smallest using its index position within the array.
- *Inner Loop*
  - Examine all subsequent items in the unsorted side looking for an item that is smaller than the currently indexed smallest item. If one is found, set the index to smallest to the newly discovered smallest value.
  - No data movement in the *inner loop* — only setting the index to smallest.
- Following completion of the *inner loop*, swap item at index to smallest with next location in sorted side. Proceed to next iteration of *outer loop*.

Observations about Efficiency

Each movement of one element from the unsorted part into the sorted part is considered one pass.

Given n elements, need $n - 1$ passes.

Each pass requires scan of all remaining unsorted elements.

Efficiency: Two nested counting loops: $O(n^2)$