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Correctness of selection sort:

—) As the selection sort is designed to sort an array by finding minimum element repeatedly from the unsorted portion. and swap it to the first of the sorted position.

~~step to paste~~

Initialization:

—) In my code. (min_index) variable is intialized where in the each iteration. the algorithm believes, that the first unsorted element is the minimum. one in the algorithm.

Scan for the minimum element:

—) It scans through unsorted element to find the minimum element.

—) If the minimum element is found then It updates the min_index.

—) It runs the same procedure after each scan.

Process of swapping:

→) After we find the minimum element. then It is swapped with the unsorted element where this places the smallest element into correct position

→) As same above It maintains the order of sorting. finding the minimum positions element and sorting It Into the correct position.

→) After the Completion of sorting

Ending: (after m-1) Iterations

→) The algorithm will done this until the entire array is sorted. after it completes. all the elements will be in correct position.

loops: invariant

-> At the start of each loop. pass.
of the outer loop the element from left
to current index ('i') are correctly sorted

-) this maintains to throughout the
algorithm.

-) When the outer loop finishes.
the array is sorted · because every
element in the array is compared
and sorted in the correct position. /

Correctness by example

-) lets take an array $\{2, 1, 3, 5, 4\}$

-) find the minimum element $[2, 1, 3, 5, 4]$
min=1 and swap with first

-> $\{1, 2, 3, 5, 4\}$ -) check for 2nd min
It's. and no swapping

-) check for the nex minimum element
$[1, 2, 3, 5, 4]$ -) no swapping

-) check for next

$[1, 2, 3, 5, 4]$ -) Ib 4 swap it

=> $[1, 2, 3, 4, 5]$ finally the array is sorted

Base case:

If $i=0$, the first is the min element and the array is sorted up to the element

Inductive step:

-) lets assume array is sorted upto ith element after the ith iteration in $(i+1)$-th iterations algo find the smallest element in the remaining array which is unsorted and swaps up with the element $(i+1)$

conclusion.

-) So by the induction. the algorithm will correctly sort the entire array.