ANVITI SINGH

1002249427

Correctness of Selection Sort :

Steps (1) Find the minimum [find smaller element in unsorted array]
(2) Swap [swap smallest element]
(3) Repeat [move to next position & repeat]

Proof

Invariant : At the start of each outer loop iteration, the part of the array up to position 'i' (ie a[0:i]) is sorted.

- Before any iteration, the array is empty, so it's trivially sorted
- Each iteration finds the smallest element in the unsorted array and places it in the correct position.

Termination : The algo. finishes when it has processed all positions from 'i=0' to 'i = n-1'. By then, all elements are in their correct positions and array is sorted.

Correctness : • Each iteration places the smallest remaining elements into it's correct position, ensuring the array becomes more sorted with each pass.
• After all iterations, the array is fully sorted, and the algo stops.

In conclusion, the selection sort is correct because it systematically places the smallest unsorted element into the correct position.