3. Selection Sort

Correctness Proof

```
def selection-sort(arr){
    n = len(arr)
    for i=0 ; i<n; i++ {
        min_index = i
        for j=i+1; j<n; j++ {
            if arr[j] < arr[min_index]{
                min_index = j
            }
        }
        swap(arr[i], arr[min_index])
    }
    return arr;
}
```

For n=1 i.e we have an array of one length

→ i=0 , j=1 (inner loop won't run)

and array remains unchanged

→ i=1 Outer loop won't run and array remains unchanged.

Hence, array is returned as is i.e. sorted array

Scripto

For n=2, array is of 2 length

i=0, j=0,1 | 0th index will be sorted.

i=1, j=0,1 | 1st index will be sorted.

i=2 ~~for~~ loop wont run.

For an array of length 2, 2 elements have been sorted.

~~Hence, the array is sorted~~

For n=k, array is of k-length

i=0, j=0....k, 0th index is sorted.

i=1, j=0...k, 1st index is sorted

i=2, j=0...k, 2nd index is sorted.

⋮

i=k-1, j=0...k, k-1 th index is sorted.

It has sorted k-elements and k=n.

Here, we have a sorted array of n-elements.