Question 2,

a.

Pseudo-code:

```
def selection_sort(A, index):
    if index >= len(A):
        print(A)
        return
    minIndex = index
    for i in range (index+1,len(A)):
        if A[minIndex] > A[i]:
            minIndex = i
    if minIndex !=index:
        exchange A[index] with A[minIndex]
    return selection_sort(A, index+1)
```

T(n) = T(n-1)+ O(n)

The running time for worst-case = $\Theta(n^2)$

b.

Pseudo-code:

```
def binary_search(A, target, start_index, end_index):
    if end_index < start_index:
        return -1
    else :
        mid = (end_index+start_index)/2
        if A[mid] == target:
            return mid
        elif A[mid] > target:
            return binary_search(A, target,start_index, mid-1)
        else:
            return binary_search(A ,target, mid+1, end_index)
```

T(n) = T(n/2)+ O(1)

T(n)= $\Theta(\lg(n))$