CPTS 350

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Homework #5

1. Pseudo-code for partition

```
partition(A, p, q):
    x = A[q]
    i = p - 1
    for j = p to q - 1 do
        if A[j] <= x then
            i = i + 1
            swap A[i] with A[j]
    swap A[i+1] with A[q]
    return i + 1
```

2. Average-case complexity of insertsort with 1% probability of decreasing order:

Insertion sort runs in $O(n)$ time in its best case, which occurs when the input array is already sorted. If there's a 1% chance that the array is in decreasing order, the expected worst case time is $0.01 \times O(n^2)$, we still need to consider the remaining 99% of the time, which contributes to the average case complexity. Since the worst-case complexity heavily outweighs the best case (which is significantly less than $O(n^2)$), the average case complexity will still be dominated by the $O(n^2)$ term, making it $\Theta(n^2)$.

3. Complexity of iqSort

- best case → $O(n \log n)$
- worst case → $O(n^2)$
- Avg case → $O(n \log n)$

4. Complexity of mixSort

- best case: $O(n \log n)$
- worst case: $O(n^2)$
- Avg case: $O(n^2)$