Task 1

For task 1 I used Merge sort algorithm but modified it. It increases the inv_count every time an unsorted and then return at the end. since it's merge sort, it maintains i<j.

Task 2

For this task I tried to make it O(n) I assigned two variables. One variable to indicate maximum sum. Another one for max value. We are keeping tracks of the maximum value since we're adding it directly to find the max_sum.

Task 3

I just wrote the given pseudo code in python.

Task 4

I've used the partition function of quick sort algorithm for this task. Also I chose high as pivot. After using partition fuction for one time we check whether the returned index value position represent kth smallest values index. If it's greater than we again use partition for the lower part. Else we operate on the upper part. We keep doing this until we find it.