

## Programming assignment 4.

**Due date:** Thursday, March 18 2021 at 4:00pm

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Implement a function to find the **K** elements of a given array that are closest to the median. (**Hint**: You could use Quick\_Select to find the answer!)

1. Request the user to enter a positive integer, and call it **n**.
2. Generate **n** random integers between -100 to 100 and save them in **a**.
3. Print the generated array.
4. Request the user to enter a number between 1 to n, and call it **K**.
5. Find the median of the array. (**Hint**: The time complexity in this step is  $O(n)$ .)
6. Save the differences from the median ( $a[i]$ -median) in a new array and call it **diff**. (**Question**: What is the time complexity in this stage?)
7. Use **diff** to find the K closest numbers.

(**Hint Important**:

✚ The **K** closet elements have the K smallest absolute difference from the median.

✚ Could you modify in your **if/while statements** of your partitioning step in your QuickSelect? Maybe using absolute values? What is the time complexity in this step?)

8. Shift the found K numbers back to their original value (+median). (**Question**: What is the time complexity in this step?)
9. Print the answer 😊
10. Calculate the total time complexity of your algorithm and present your answer when demoing.

**Example 1:** Input:  $a = [10, 4, 2, 15, 18]$ ,  $K = 2$

Output: 4, 15

**Example 2:** Input:  $a = [25, 3, 1, 8, 7, 2, 32]$ ,  $K = 4$

Output: 1, 2, 3, 8