Wesly Lim

**Run Time:**

The solution for the Amne coding challenge runs in *O(N \* K*).

**Algorithm:**

This program takes in a text file “input.txt” and parses it to obtain the values of *N, K*, and the *list* of N home prices.

The values are passed into the function homeVal(*N, K, list*), where it loops through the indices (*0, N – K + 1*) once, performing the function homeValHelper(*list)* on the current window of the list. For example, if the current index is *i*, then the function is performed on the indices (*i, i + K*), or in other words, list[*i:i + K*].

homeValHelper(list) loops through the list passed through once, keeping track of consecutive increases and decreases, labeled *next*. For example, if *list[j] > list[j + 1],* then *next* is decremented because the next value is decreasing. The return value for homeValHelper is *counter,* which is continually added by the constantly changed value of *next.*

Without loss of generality, this is the same for *list[j] < list[j + 1].* When *list[j] = list[j + 1]*, *next* is set to zero.

The program terminates when homeVal finishes going through *N – K + 1* indices and prints out all of the values.

**Explanation:**

As per the prompt, we must go through the indices *(0, N – K + 1)* of the list. The brute force method makes the program check every possible subrange, which is resolved in *O(N \* K^2).*

To make this more optimal, we go through each window only once by accounting for double-counted values. For example, for the window *[1, 2, 3],* the subranges are *[1, 2], [2, 3], [1, 2, 3].* The subranges are all increasing, so the value returned is 3. Instead of checking all of the subranges, increment *next* for every consecutive increase. This works because if [*list[j], list[j+1]*] and [*list[j+1], list[j+2]*] are increasing, this means [*list[j], list[j+1], list[j+2]*] is also increasing, which means we can increment *next* instead of checking again.

This method only works for consecutive decreases and increases, and allows homeValHelper(*list)* to run in *O(K)* instead of *O(K^2).*