Algorithm Proof

The algorithm implimented ended up with an $O((N-W)+M^2)$ time complexity. First, the inputs are taken through getline() and stored in variables key and hint. The indecies in the key are then found using a while loop with time complexity O(N-W), if statements, and the substr() function and are stored in int array icode[]. Next, rcode[] is initialized and icode[] is copied into it in reverse order in O(M) time complexity. Next, a nested for loop searches in $O(M^2)$ time for each element of icode[] in rcode[] and rcode[] elements in icode[] and stores them in strings ficode and frcode respectively. Once, icode[] and rcode[] have been compared and ficode and frcode have been filled, the longer string between ficode and frcode is then printed as the output. Thus, the final time complexity is $O((N–W)+M+M^2)$ which equals $O((N-W) + M^2)$ time complexity.