# Project 6 Report

The purpose of this paper is to determine the differences in the time taken to complete insertion and deletions between sorted and unsorted maps.

Hash Function: The maps are constructed using the same hash function. This is a hash function that takes a string as input and returns an integer hash value. Here's how it works:

1. It initializes the hash value to zero.
2. It iterates through each character in the input string, multiplying the current hash value by 31 and adding the ASCII value of the current character.
3. The resulting hash value is then modulo-ed with 10007 to ensure that the hash value is within a specific range. The modulo operation ensures that the hash value is within the range of 0 to 10006.
4. Finally, the hash value is returned.

To compare the differences in performance of inserting and removing elements of a map and an unordered map, eight randomly generated .txt files were created with different numbers of operations. The smallest .txt file had 20 operations and the largest had 966 operations.

The map performed the operations of the input faster than the unordered map for every input. The graph below displays a scatterplot of the difference between the unordered map and the map (time taken by the unordered minus the time taken by the map).
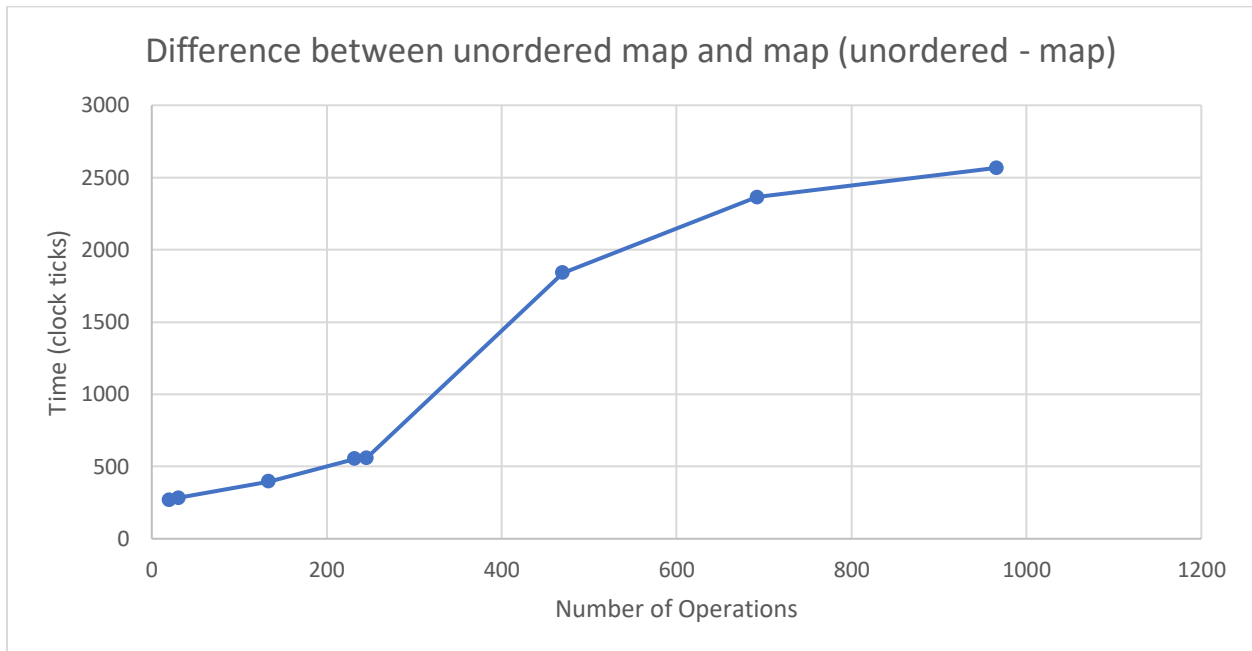
The trend of the graph shows that the difference between the time taken for the unordered map and the map increases as the number of operations in the input file increases. It is important to remember that other operations occurring within the computer can affect the data.