Lab2: Dynamic Programming

1. What is the run-time complexity of your implementation

   The run time complexity of the minCost function using recursion is O(N x log(N)). The reason is according to the code the recursion happens 2 times which result running code in log(N) run time complexity, and it happens N times. Therefore the total run time complexity is in O(N x log(N)).

2. Argue that dynamic programming can be used to improve the run-time.

   Dynamic programming is used in recursive algorithm finds itself reaching the same situations (input parameters) many times. There is a general transformation from recursive algorithms to dynamic programming known as Memorization, in which there is a table storing all results ever calculated in recursive procedure. When the recursive procedure is called on a set of inputs which were already used, the results are just fetched from the table. This reduces recursive problem to iterative problem.

   Dynamic programming can be even smarter, applying more specific optimizations. For example, sometimes there is no need to store the entire table in memory at any given time, which all results in reducing the run time of a program.

3. Calculate the run-time of your implementation in part 4 above. Assume, ha shing is O(1).

   The run time complexity of the minCost function using DP is O(N). The reason is according to the code even though the recursion happens 2 times the minimum values are saved in a memory which reduces the redundancy of finding the same value using same ooperation.