Hw3
Maximum-subarray problem

Part A. Programming(50%)

You have to use divide-and-conquer approach in your code.

Input: input.txt
Output: output.txt
The program should be named as studentID.c/.cpp

Input format:
10
13 -3 -25 20 -3 -16 -23 18 20 -7

Description:
There are two rows and one end line("\n") in the input file.
First row contains one number, n which indicates the size of the array and 1 < n <= 2^{40}.
Second row contains n numbers which constructs the input array and the size of each numbers will not exceed 2^{31}- 1.

Output format:
38

Output contains one number, m and one end line("\n").
Please output the maximum sum of the subarray.

Part B. Report(50%)

Implement the brute-force algorithm by yourself and complete the following tasks.

What problem size n(the size of the input array) gives the crossover point at which the recursive algorithm beats the brute-force algorithm? Then, change the base case of the recursive algorithm to use the brute-force algorithm whenever the problem size is less than n. Does that change the crossover point?

The name of the report should be named as studentID.docx
The more detail you report, the more scores you can get.

Part C. Bonus(100%)

Please read the following description.

4.1-5

Use the following ideas to develop a nonrecursive, linear-time algorithm for the maximum-subarray problem. Start at the left end of the array, and progress toward the right, keeping track of the maximum subarray seen so far. Knowing a maximum subarray of $A[1 \,..\, j]$, extend the answer to find a maximum subarray ending at index $j+1$ by using the following observation: a maximum subarray of $A[1 \,..\, j+1]$ is either a maximum subarray of $A[1 \,..\, j]$ or a subarray $A[i \,..\, j+1]$, for some $1 \le i \le j+1$.

You are asked to find the maximum sum of the subarray by using Dynamic Programming approach.
Input a large size of array A (larger than 10^9) and compare the running time of Dynamic Programming approach to Divide-and-Conquer approach.

The input and output format are the same as Part A.
This part is bonus, it's up to you to hand in or not.

The program should be named as studentID_bonus.c/.cpp
The report should be named as studentID_bonus.docx