In-class Practice 3 (due 2020/01/30 in class)

1. Finish the 2D closest points problem using divide and conquer in "closest-points.cpp", and report the runtime difference from the O(N2) brute force method in the following table. You should make sure your solution is correct first.

N	Brute-Force Runtime (ms)	Divide-and-Conquer Runtime (ms)
10		
100		
1000		
10000		
100000		

2. Finish the maximum subarray sum problem using divide and conquer in "maximum-subarray-sum.cpp", and report the runtime difference from the O(N2) brute force method in the following table. You should make sure your solution is correct first.

N	Brute-Force Runtime (ms)	Divide-and-Conquer Runtime (ms)
10		
100		
1000		
10000		
100000		

Can you do better than divide and conquer? If yes, paste your code below.

Name: uid:

3. Finish the merge sort function `merge_sort` using divide and conquer in "merge-sort.cpp". In addition, finish the function `std_sort` using the C++ standard sorting library described at https://en.cppreference.com/w/cpp/algorithm/sort. Measure the runtime at different input sizes and report these values in the table below:

You should make sure your solution is correct first.

N	SelectionSort Runtime (ms)	MergeSort Runtime (ms)	std::sort Runtime (ms)
10			
100			
1000			
10000			
100000			

Can you outperform `std::sort`? Discuss the reason.

4. Watch the video "Speed Is Found In The Minds of People" presented by Andrei Alexandrescu at CppCon 2019 (https://www.youtube.com/watch?v=FJJTYQYB1JQ), and give your feedback/comment below:

Note:

To compile a .cpp program: `g++ simple.cpp -O2 -o simple`
To feed a program with a test file from the standard output: `./simple < test.txt`
To measure the runtime of a program: `time -p ./simple < test.txt`