

## ESO207: Data Structures and Algorithms

Programming Assignment 1

Due: August 30 midnight

*Instructions:* The precise input-output format will be specified by Programming TAs for submission on Hackerearth.

**Problem 1. Counting Significant Inversions.** Given an array  $A = [a_1, a_2, \dots, a_n]$  of  $n$  integers, we say that a pair  $(i, j)$  with  $i < j$  is a *significant inversion* if  $a_i > 2a_j$ .

**Problem 2. Sum of Sets.** Let  $A$  and  $B$  be two sets that each have  $n$  integers in the range from 0 to  $10n$ . We wish to compute the Cartesian sum of  $A$  and  $B$  defined as

$$C = \{x + y : x \in A \text{ and } y \in B\} .$$

$C$  has numbers in the range 0 to  $20n$ . We wish to find the elements of  $C$  and the number of times each element of  $C$  is realized as the sum of elements of  $A$  and  $B$ . Use FFT technique to solve this problem efficiently.