Maths Circle India

TIFR-STCS Maths Circle Team

Session 4: June 3, 2022

2 Order Order

Kiron has just been telling Arun and Barun about a new game she has designed for them to play. In the game, Arun writes down a list of n numbers, say $a_1, a_2, \ldots, a_n$. Barun also independently writes down a list of n numbers, say $b_1, b_2, \ldots, b_n$. After looking at Arun's list, Barun is allowed to rearrange his list: he has to keep the same collection of numbers, but he can reorder them however he likes. Let us call this rearranged list $c_1, c_2, \ldots, c_n$. The goal is to make this rearranged list in such a way that the sum

$$a_1 \times c_1 + a_2 \times c_2 + a_3 \times c_3 + \cdots + a_{n-1} \times c_{n-1} + a_n \times c_n$$

is as large as possible. How should Barun arrange his list?