MacLaurin's inequality

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Let $a_1, a_2, \ldots, a_n$ be positive real numbers , and define the sums S_k as follows :

$$S_k = \frac{\displaystyle\sum_{1 \le i_1 < i_2 < \cdots < i_k \le n} a_{i_1} a_{i_2} \cdots a_{i_k}}{\dbinom{n}{k}}$$

Then the following chain of inequalities is true :

$$S_1 \ge \sqrt{S_2} \ge \sqrt[3]{S_3} \ge \cdots \ge \sqrt[n]{S_n}$$

Note : S_k are called the averages of the elementary symmetric sums
This inequality is in fact important because it shows that the arithmetic-geometric mean inequality is nothing but a consequence of a chain of stronger inequalities