Chebyshev's inequality

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If $x_1, x_2, \ldots, x_n$ and $y_1, y_2, \ldots, y_n$ are two sequences (at least one of them consisting of positive numbers):

- if $x_1 < x_2 < \cdots < x_n$ and $y_1 < y_2 < \cdots < y_n$ then

$$\left(\frac{x_1 + x_2 + \cdots + x_n}{n}\right)\left(\frac{y_1 + y_2 + \cdots + y_n}{n}\right) \leq \frac{x_1 y_1 + x_2 y_2 + \cdots + x_n y_n}{n}.$$

- if $x_1 < x_2 < \cdots < x_n$ and $y_1 > y_2 > \cdots > y_n$ then

$$\left(\frac{x_1 + x_2 + \cdots + x_n}{n}\right)\left(\frac{y_1 + y_2 + \cdots + y_n}{n}\right) \geq \frac{x_1 y_1 + x_2 y_2 + \cdots + x_n y_n}{n}.$$