Enoch Yu

$\forall\, a_i, b_i, \dots, z_i \in \mathbb{R}^+$,

$$(a_1+\cdots+a_n)^{\lambda_a}(b_1+\cdots+b_n)^{\lambda_b}\cdots(z_1+\cdots+z_n)^{\lambda_z} \geq a_1^{\lambda_a}b_1^{\lambda_b}\cdots z_1^{\lambda_z} + \cdots + a_n^{\lambda_a}b_n^{\lambda_b}\cdots z_n^{\lambda_z}$$

for all $\lambda_i \geq 0$ s.t. $\lambda_a+\lambda_b+\cdots+\lambda_z = 1$

$$(x_1^2+\cdots+x_n^2)(y_1^2+\cdots+y_n^2) \geq (x_1y_1+\cdots+x_ny_n)^2$$

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proof $\lambda_a = \lambda_b = \frac{1}{2}$

$$(a_1+\cdots+a_n)^{\frac{1}{2}}(b_1+\cdots+b_n)^{\frac{1}{2}} \geq a_1^{\frac{1}{2}}b_1^{\frac{1}{2}}+\cdots+a_n^{\frac{1}{2}}b_n^{\frac{1}{2}}$$

$x_i = \sqrt{a_i}$, $y_i = \sqrt{b_i}$

$$(x_1^2+\cdots+x_n^2)^{\frac{1}{2}}(y_1^2+\cdots+y_n^2)^{\frac{1}{2}} \geq x_1y_1+\cdots+x_ny_n$$

$$(x_1^2+\cdots+x_n^2)(y_1^2+\cdots+y_n^2) \geq (x_1y_1+\cdots+x_ny_n)^2$$

$\square$