Problem Session 2.

Use the theorem of the means to show
\[ \sum (a_i + b_i) \] \[ \sum \frac{a_i b_i}{(a_i + b_i)} \leq \sum a_i \sum b_i \]
with equality only if \( \hat{a}, \hat{b} \) are linearly dependent.

Prove \( \lim_{r \to \infty} \frac{M_{\alpha} (\hat{a})^r}{M_{\beta} (\hat{a})^r} = M_{\alpha} (\hat{a}) = \text{Max } a_i \).