IB Physics Topic D2 Electric and Magnetic Fields; SL & HL

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Consider a list of n distinct positive integers with sum S. We wish to show that, if we remove an entry k from the list such that the resulting mean is larger, then it must be the case that $k < \frac{S}{n}$.

The old mean is $\frac{S}{n}$, and the new mean is $\frac{S-k}{n-1}$. The "if" part of the statement is equivalent to

$$\frac{S-k}{n-1} > \frac{S}{n} = \frac{S-\frac{S}{n}}{n-1}$$

This is true if and only if

$$k < \frac{S}{n}$$