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Carleman's Inequality - History, Proofs and Some New Generalizations

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Abstract: Carleman's inequality reads

$$a_1 + \sqrt{a_1 a_2} + ... + \sqrt[k]{a_1 ... a_k} < e\,(a_1 + a_2 + ...),$$

where a_k , $k = 1, 2, ...,$ are positive numbers. In this paper we present some simple proofs of and several remarks (e.g. historical) about the inequality and its corresponding continuous version. Moreover, we discuss and comment on some very new results. We also include some new proofs and results e.g. a weight characterization of a general weighted Carleman type inequality for the case $0 < p \leq q < \infty$. We also include some facts about T. Carleman and his work.

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