

Re: Inequality with max I want to understand

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Hi,

I was reading a paper and hit an inequality I have never seen before:

$$(a + b) / (c + d) \leq \max (a/c, b/d)$$

In the paper I have the additional constraints that c

$$0, d > 0, a \geq$$

$$0, b \geq 0.$$

I am interested in where this comes from and other examples. If there are

books or other resources that contain stuff similar to this I would like to know.

I have no idea how I might search for something like this online for example.

I haven't sat down yet for an extended period to try and prove this.

I don't really have an idea of how to try and tackle it either.

Mathematica can find counter examples with negative variables but not with the additional constraints.

Thanks.
Neill.

Suppose not, and let $t := d/c > 0$.

Then we have:

$$0 \leq a + a*t < a + b \text{ and}$$

$$0 \leq b + b/t < a + b, \text{ hence}$$

$$0 \leq a*t < b, \text{ and } 0 \leq b/t < a. \text{ Now, multiply these...}$$

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