

Proposed problem

Let x, y be positive real numbers. Prove that

$$\frac{2xy}{x+y} + \sqrt{\frac{x^2+y^2}{2}} \leq \sqrt{xy} + \frac{x+y}{2} + \frac{(L(x,y) - \sqrt{xy})^2}{\frac{2xy}{x+y}}$$

where $L(x, y) = (x - y)/(\ln(x) - \ln(y))$ if $x \neq y$ and $L(x, x) = x$.