Alternative Proof of 100 Inequalities: Method of Separating Tangents

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The well-known Jensen inequality: $f(x_1)+f(x_2)+...+f(x_n)=nf(x_0)$, where $l(x_1)+l(x_2)+...+l(x_n)=nl(x_0)$, holds true if f is convex functions and $l(x)=x$. However, we found that it is possible to apply it to some problems related to non-convex functions for which Jensen's inequality holds true locally. Having considered a set of such functions, we noted some general patterns. We show that the key point, which provides Jensen's inequality holds true locally, is that the plot of function should be situated at only one side from the local base curve defined compatible with conditional variables. Moreover, we have achieved even more general result. It turned out that the graph of the function can be located on either sides of the local base curve, with the condition that the function satisfies additional conditions: $\min\{f(x):x?G\}+(n-1)\min\{f(x):x?l\}=nf(x_0)$. This result allows one to prove easily difficult types of inequalities, and on the other hand to broaden applications in physics, economy, and information theory. On the basis of the conducted analysis of different sources it is possible to claim, that our method is applicable to about 3/4 of studied inequalities related to Jensen's inequality.

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