A new mean with inequality

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My project is concerned with the various definitions of means and looking at the H mean of elementary means. The main techniques used in this project are various famous inequalities and combinatorial identities, such as AM-GM inequality, rearrangement inequality etc.

The project started with Kais Hamza's paper, a new mean with inequality. I began to tackle the problem by showing that the condition which holds families of means together does not imply the mean function is bounded by the minimum and the maximum of the group of numbers. Motivated by this counter example, I constructed the H-mean of ordered mean. And it turns out that the H-mean of ordered mean have a nice expression. Further more, it has nice alternating properties with the even H-ordered mean takes greater value over the odd ones. The proof only uses some inequalities and combinatorial identity.

The experience gained in this project has made me consider doing further mathematical research. My supervisor Kais Hamza provided valuable support in the project. I would like to thank CSIRO and AMSI for giving me the opportunity to experience research into some interesting topics.