



Math for the people, by the people.

expectation example

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The contraharmonic mean of several positive numbers u_1, u_2, \dots, u_n is defined as

$$c := \frac{u_1^2 + u_2^2 + \dots + u_n^2}{u_1 + u_2 + \dots + u_n}.$$

This has certain applications; one of them is by [1] the following.

If $\langle u_1, u_2, \dots, u_n \rangle$ is the distribution of the seats of n parties, s the total number of seats in the body of delegates ($u_1 + u_2 + \dots + u_n = s$), and one draws a random seat (with probability $1/s$), then the size of the drawn delegate's party has the *expected value*

$$\frac{u_1}{s} \cdot u_1 + \frac{u_2}{s} \cdot u_2 + \dots + \frac{u_n}{s} \cdot u_n = c.$$

References

- [1] CAULIER, JEAN-FRANÇOIS: The interpretation of the Laakso–Taagepera effective number of parties. – *Documents de travail du Centre d'Economie de la Sorbonne* (2011.06).