

Think It Over



This section of *Resonance* presents thought-provoking questions, and discusses answers a few months later. Readers are invited to send new questions, solutions to old ones and comments, to 'Think It Over', *Resonance*, Indian Academy of Sciences, Bangalore 560 080. Items illustrating ideas and concepts will generally be chosen.

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The Ten Pirates Problem

The following problem was heard from Prof. Yehuda Vardi of Rutgers State University, New Jersey, USA.

Problem: Suppose that you are the chieftain of 10 sea pirates and that your group stumbles upon a treasure of 100 gold coins. Further, let the group have a hierarchical structure in the sense that the members of the group have ranks from 1 to 10 with the chieftain having rank 1 and the weakest in the group having rank 10. It is agreed upon by your group that the chieftain will propose a strategy to divide the 100 gold coins among the group members which will be put to vote. If the chieftain succeeds in getting at least 50% of the votes including his own then the coins will be divided as per the strategy and if the chieftain fails to get the required votes then the chieftain will be thrown into the sea and the next person in the hierarchical order will get the chance to propose a strategy which will be put to vote and the same procedure is repeated till somebody gets at least 50% of the votes. Let us also assume that there are no deals between the group members and that the pirates think rationally in the sense that they will think that one gold coin is better than no gold coins. One strategy of the chieftain could be to divide the 100 gold coins equally among the members of the group with each one getting 10 gold coins. The question is what is the best strategy that you, the chieftain, has to propose so as to save your life and which will fetch you the maximum number of gold coins?

