Baccalauréat Session de juin 2014

Épreuve de section européenne

Pirate game

There are four rational and very clever pirates, A, B, C and D. They find 100 gold coins. They must decide how to distribute them.

The pirates have a strict order of seniority: A is superior to B, who is superior to C, who is superior to D.

The pirates rules of distribution are thus: that the most senior pirate should propose a distribution of coins. The pirates, including the proposer, then vote on whether to accept this distribution. If the proposed allocation is approved by a majority or a tie vote[1], it happens. If not, the proposer is thrown overboard from the pirate ship and dies, and the next most senior pirate makes a new proposal to begin the system again.

Pirates base their decisions on three factors. First of all, each pirate wants to survive. Second, given survival, each pirate wants to maximize the number of gold coins he receives. Third, each pirate would prefer to throw another overboard, if all other results would otherwise be equal. The pirates do not trust each other, and will neither make nor honor any promises between pirates apart from the main proposal.

From various sources.

Questions

1. What will happen if A proposes 100 for himself and 0 for the others ? And if he proposes 25 coins to each pirate ?
2. Suppose all except C and D have been thrown overboard. What will C propose ?
3. Suppose that B, C and D are left. They all know what will happen if B is thrown overboard (previous question). What will B propose ?
4. What is the solution for A ?
5. If the game was played with five pirates, what would the solution for A be ?

1 A tie vote is when exactly the votes are shared equally for and against.