

Puzzle – 02

<https://youtu.be/j5vch2EHJjA>

Q- 5 Pirates and 1000 Coins Distribution

There are 5 pirates, A, B, C, D and E. They have a strict hierarchy, A is senior to B, B is senior to C, C is senior to D and D is senior to E.

These pirates have 1000 gold coins which they want to distribute among themselves. The rules of distribution are as follows:

1. The most senior pirate proposes a distribution of coins.
2. The pirates, including the proposer, then vote on whether to accept this distribution. Which means All the pirates (including the most senior) will vote on whether they accept the proposed distribution or not.
3. If the majority accepts the plan, the coins are distributed and the game ends. Which implies that if half or more pirates vote in the favour of distribution, then proposed distribution is accepted and game ends.
4. If more than half pirates vote against the distribution, then the senior most pirate will be killed and the next senior most will propose a new distribution and this will continue.
5. The process repeats until a plan is accepted or if there is one pirate left.
6. In case of a tie vote, the proposer has the casting vote. (Casting vote is a vote that someone may exercise to resolve a deadlock.)

These are distribution rules, and there are some rules followed by pirate also.

And These are the rules every pirate follows

1. First of all, each pirate wants to survive.
2. Second, given survival, each pirate wants to maximize the number of gold coins he gets.
3. Third, given a situation of no-gain no-loss, each pirate would prefer to kill the other pirate.

Considering that all pirates are very strong in logic, and if a logic can be deduced, then they will deduce it. The problem statement is, how should A distribute the coins so that he does not get killed and also gets the maximum coins possible.

My Approach and Solution –

Step 1: Understanding the number of pirates and the voting system.

There are five pirates in total, A, B, C, D, and E. When a distribution proposal is made, all pirates, including the proposer, vote on whether to accept it or not. If half or more of the pirates vote in favour, the proposal is accepted and the distribution is finalized.

Step 2: Analysing the decision-making process

To determine the optimal distribution, we need to think from the perspective of each pirate. The decision-making process can be broken down as follows:

- Pirate A: As the most senior pirate, A needs to propose a distribution that will secure at least half the votes in their favour.
- Pirates B, C, D, and E: They will vote on the proposed distribution based on their own interests, survival, and maximizing their own gold coins.

Step 3: Considerations for Pirate A's distribution proposal

To ensure that Pirate A's proposal is accepted, it should meet the following criteria:

1. A should allocate the minimum number of coins to the other pirates to secure their votes.
2. A should keep enough coins for themselves to secure their own vote.
3. A should use their casting vote strategically in case of a tie.

Step 4: Finding the optimal distribution

Let's consider the possible scenarios and distribute the coins accordingly:

- Scenario 1: Only Pirate A remains.

In this case, A can keep all 1000 coins for themselves as there are no other pirates to vote against them.

- Scenario 2: Pirate A and Pirate E remain.

Since Pirate E will be the only one voting, A needs to secure E's vote. A can offer E just one coin, ensuring that the distribution is accepted and A survives.

- Scenario 3: Pirate A, Pirate D, and Pirate E remain.

To secure E's vote, A can offer E one coin as before. To secure D's vote, A needs to offer D one coin as well. That leaves 998 coins for A, which is the maximum they can keep for themselves while still securing the majority vote.

- Scenario 4: Pirate A, Pirate C, Pirate D, and Pirate E remain.

Similar to the previous scenario, A needs to offer E and D one coin each. Additionally, A should offer C one coin to secure their vote. A would then keep 997 coins for themselves.

- Scenario 5: All pirates remain.

Following the same approach, A needs to offer one coin each to B, C, D, and E to secure their votes, keeping 995 coins for themselves.

Step 5: Summary of optimal distributions

Based on the scenarios analysed, here's a summary of the optimal distribution for Pirate A in each case:

- Scenario 1: A: 1000
- Scenario 2: A: 999, E: 1
- Scenario 3: A: 998, D: 1, E: 1
- Scenario 4: A: 997, C: 1, D: 1, E: 1
- Scenario 5: A: 995, B: 1, C: 1, D: 1, E: 1

These distributions fulfil the conditions of maximizing A's coins while securing enough votes to avoid being killed.

Remember that this solution assumes that each pirate will act logically and in their own self-interest, following the rules and considering the preferences of survival, maximum coins, and killing others in case of a no-gain no-loss situation.