



GAME THEORY

OUR TEAM



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English Auction

Auctioneer calls out higher and higher prices, with different bidders battling it out, until one bidder is left and no one's willing to make a higher bid than that price. That's when the auction ends.

As a bidder, you can adjust your strategy in real time, as the auction develops, because you can hear other bids.



Robin Hood's Diamond Heist

(english auction game)

Robin Hood, the legendary outlaw, has successfully robbed a wealthy individual of his precious diamonds. However, in the midst of his daring escapade, a group of cunning thieves carried out a daring bank heist, making away with five valuable diamonds worth 50cr, 40cr, 30cr, 20cr, and 10cr, respectively. These stolen diamonds are destined for the black market.

To level the playing field, each prospective buyer at the diamond auction will be given an initial amount of 50cr in cash. The auctioneer will randomly select one of the stolen diamonds to be auctioned off.

The auction will proceed in the style of an English auction, where the participants bid increasing amounts of their cash. The participant with the highest net worth, calculated as the sum of their cash balance and the worth of their currently held diamonds, will be declared the winner.



Rules :

The minimum allowed bid amount is 5cr.

In case of tie occurs in terms of net worth, the following tiebreakers will be applied:

- If two participants have equal cash balances, the participant with the more valuable diamond will be declared the winner..
- If they have same cash balance and same diamond balance then the auction then the participant having more expensive diamond will win the auction.
- During bidding of final diamond, if two participants have same cash value and both willing to spend it all then the person with less number of diamonds will be given the diamond of that round. If number of diamonds are also equal then person with less expensive diamond will be given the diamond of that round.



Mathematics:

- 5 diamonds of 50cr, 40cr, 30cr, 20cr, 10cr.
- 3 Players, each having cash balance of 50cr.
- Minimum bid is of 5cr.



Stratergy :

- Be patient and don't bid blindly in auction.
- Calculate the odds of your winning fast to steal diamonds at a good price from others.



Dutch Auction

A Dutch auction is a unique auction mechanism where the seller starts with a high initial price for an item and then gradually lowers it until a bidder decides to accept the current price. This type of auction is often used in financial markets, such as for initial public offerings (IPOs) of stocks and bonds, as well as in other contexts like government auctions of goods and artwork. It relies on the principle of buyers indicating their willingness to purchase at the current price, with the auction concluding when a bidder decides to accept the offered price, making it an efficient way to determine market-clearing prices.



Robin Hood's Diamond Rush

(dutch auction game)

After successfully selling the stolen diamonds on the black market, Robin Hood and his gang now face the challenge of safely transporting these valuable gems to their respective buyers. To accomplish this task, they have enlisted the help of three skilled truck drivers, each of whom is available to work for a total of hours. These drivers require time for refueling and rest, which should be factored into the plan.

Each diamond has its unique transportation time requirement, and the contracts for transporting these diamonds will be awarded through a Dutch-style auction, where participants bid for the transportation contracts.

The primary objective is to maximize the total earnings while minimizing the time required for transportation. Here are the details for each diamond:

50cr diamond takes 5 hours to transport, 40cr diamond takes 4 hours to transport similarly 30cr, 20cr and 10cr takes 3 hours, 2hours and 1 hour respectively.

For each trip, there is a fuel cost of 5cr that must be accounted for in the bidding process. Bids for each diamond's transportation contract will start from its initial price.

Your task is to develop an optimal transportation plan that maximizes the total earnings while ensuring that the drivers' working hours do not exceed 7 hours per driver. Find the best combination of diamonds to transport and the corresponding bids to achieve the highest profit within the given constraints.

Rules :

- The order in which participants place their bids is crucial and must remain fixed.
- The selection of which contract to bid on will be randomized.
- In case of a tie in cash balance between two participants, the winner will be the one who completes the transportation in the shortest amount of time.
- If both cash balance and time taken are identical, the participant with the higher face value of diamonds will be declared the winner.
- Your task is to design a strategy for Robin Hood and his gang to maximize their earnings while meeting the specified rules and constraints. Determine the optimal combination of diamonds to transport and the corresponding bids to achieve the highest profit within the given constraints.

Mathematics :

Fuel Cost: 5cr.

Contract Start Price: 50cr(5hrs), 40cr(4hrs), 30cr(3hrs), 20cr(2hrs), 10cr(1hr)

Minimum bid: 5cr.

Total time: 7 hrs.

Metrics: Cash Balance if same then most efficient (least time taken)



Stratery :

- If the cash balance and time left are equal then the driver with the least amount of shipments wins, as would be less tired and spend more quality time with his family.
- This game requires aggressive behavior of players as players have to grab the shipments and maximize the amount of money they get.
- It is observed that drivers who take extreme contracts generally take the win.
- Players should analyze the inflow and outflow of money judiciously before bidding
- Players shouldn't initially go for contract of higher diamonds at low costs because it will increase their time consumed significantly with much lesser profits.

ASSUMPTIONS

- There will be fair bidding among the participants.
- In case of same bid, the participant who made the bid first would be taken into consideration.

OUTCOMES

<https://github.com/LEENA8P/Game-Theory>

CONCLUSION

- Generally player who maintains a balance between high and low priced diamonds wins the auction.
- Players should also try to decrease the profit of others by bidding wisely.

THANK YOU