GAME THEORY

PRESENTED BY

ANUSHKA GUPTA

AYUSH SAVAR

ARADHYA JAIN

AYUSH DADHICH

CONTENTS

EXIT

INTRODUCTION

This is a research-based project centred around game theory, where we shall analyse experimental data which will be obtained using two auction games that are designed by us.

AUCTIONS

An auction refers to the sale of goods or services by offering them up for bids. They are based on the idea that competitive bidding tends to push prices higher, thus maximising profits.

TYPES OF AUCTIONS

First-price, sealed-bid auction

Second-price, sealed-bid (Vickrey) auction

EXIT

FIRST-PRICE, SEALED-BID AUCTION

In this type of auction, all the bidders simultaneously submit sealed bids to the auctioneer. No bidder knows the bid of any other participant.

The highest bidder wins and pays the value of their bid.

EXIT

SECOND-PRICE, SEALED-BID (VICKREY) AUCTION

In this type of auction, all the bidders simultaneously submit sealed bids to the auctioneer. No bidder knows the bid of any other participant.

The highest bidder wins and pays the value of the second highest bid.

EXIT

GAME 1

Based on First Price Auction

EXIT

GAME RULES

- The game can be played in groups of 4-5 people.
- In each round, everyone secretly writes down two numbers (their bids) on a piece of paper.
- There are a set number of rounds, let’s say 10.

In each round, you can pick a number between $5 and $50 as your first bid, and another number between $40 and $90 as your second bid.

After everyone submits their bids for a round, something called "scores" are calculated. This score tells us how good your bids were compared to everyone else's. If your bids are close to a special number that's determined using math, you get a good score. If they're far away, you get a not-so-good score.

The person with the best score in each round is the winner of that round. We repeat this for all the rounds.

EXIT

CALCULATING PAYOFF

TO CALCULATE THE PAYOFF, WE LOOK AT THE HIGHEST BIDS THE PLAYERS MADE WHEN THEY WON ROUNDS, ADD THEM ALL UP, AND THEN DIVIDE BY THE TOTAL NUMBER OF ROUNDS. FINALLY, WE MAKE THIS NUMBER A BIT BIGGER BY MULTIPLYING IT BY 1.2. THIS NUMBER IS THE PAYMENT THE OVERALL WINNER GETS.

IT'S NOT JUST LUCK!

You need to think about what numbers to pick for your bids. You want them to be close to the special number but not too far from each other. It's like trying to guess a tricky question's answer.

EXIT

- Calculating scores in detail
- Link to code

```
Round 1
Bids: [(6, 52), (39, 64), (18, 55), (39, 77)]
Round 2
Bids: [(16, 71), (13, 61), (19, 82), (29, 64)]
Round 3
Bids: [(46, 79), (45, 69), (47, 42), (19, 49)]
Round 4
Bids: [(50, 90), (43, 89), (21, 89), (22, 45)]
Round 5
Bids: [(29, 53), (43, 56), (30, 89), (50, 49)]
Round 6
Bids: [(37, 49), (27, 56), (19, 87), (41, 45)]
Round 7
Bids: [(5, 42), (38, 72), (12, 59), (23, 42)]
Round 8
Bids: [(22, 62), (48, 43), (29, 60), (46, 55)]
Round 9
Bids: [(39, 80), (28, 44), (37, 52), (6, 85)]
Round 10
Bids: [(44, 62), (19, 41), (19, 86), (33, 82)]
```

```
Game Results
============
Round Winners:
Player 1: 3 wins
Player 2: 1 wins
Player 3: 3 wins
Player 4: 3 wins

Overall Winner: 1
Overall Winner's Final Payment: $95.16
```

GAME 2

Based on Second Price Auction

GAME RULES

- The bidders can bid any amount between $20-$100
- Each player will submit 1 sealed bid per round.
- The number of rounds will be nearest integer to log2n where n is the highest bid placed in the first round.

The winner is the bidder whose bid is closest to (highest bid + average bid) / 2

Winner will pay an amount $10 more than lowest bid in the round number closest to log2(n) + sqrt(highest bid)

In case of a tie we decide the winner by rolling a die!!!

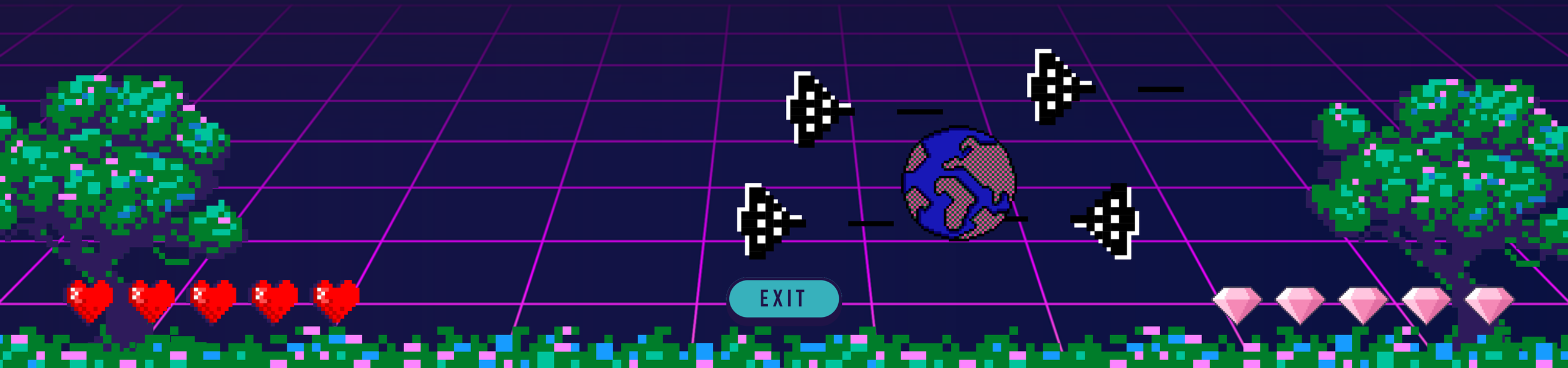
EXIT

ROUND	A	B	C
1	60	96	29
2	28	86	26
3	95	45	25
4	93	79	88
5	87	68	56
6	92	49	64
7	99	66	95

- The number of rounds will be log2(96) ~ 7.
- Winner of round 1 will be B.
- B wins 3 rounds, A wins 2 rounds and C also wins 2 rounds.
- Thus the overall winner is B.

PAYOFF

The winner will pay $10 more than the integer closet to the sum of the lowest bid in round
number 7 and sqrt(99) i.e. =66 + 9 + 10 = 85
Player B wins the game and will pay $85




THANK YOU