

ULTIMATUM GAME



Player 1 is given some money.

He makes an offer to Player 2.

If Player 2 says Yes, then the offer is implemented.

If Player 2 says No, then both players end up with nothing.

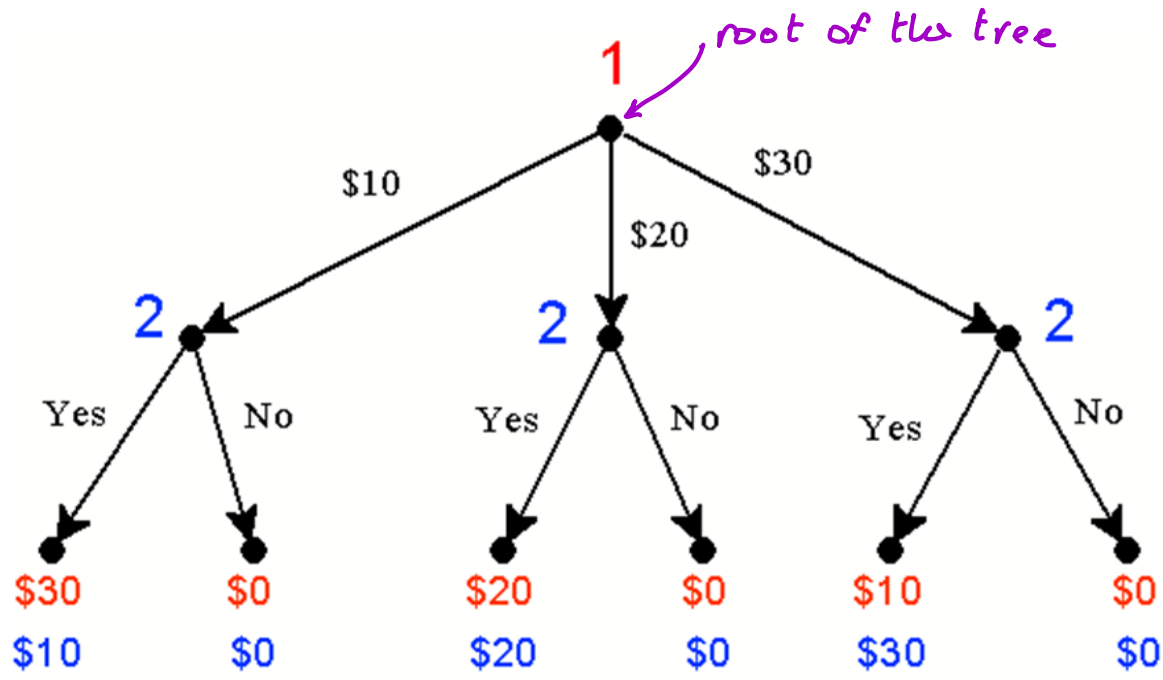
How much should Player 1 offer to Player 2?

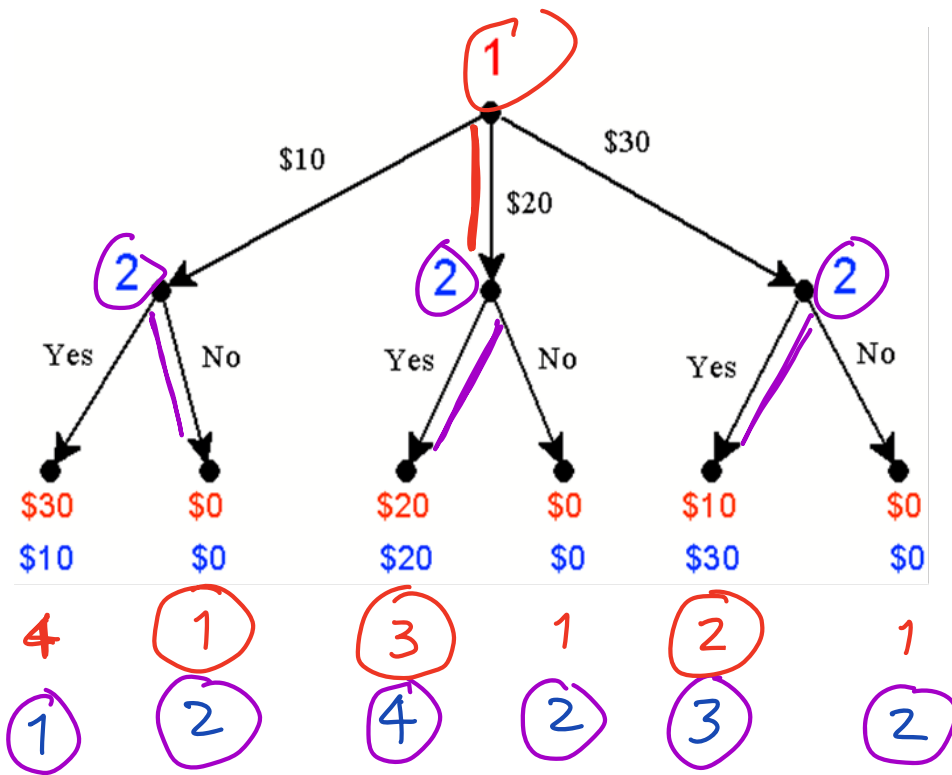
Player 1 is given \$40.

He makes an offer to Player 2 (\$10 or \$20 or \$30).

If Player 2 says Yes, then the offer is implemented.

If Player 2 says No, then both players end up with nothing.





Suppose that Player 1 is selfish and greedy:

	Utility
best (\$30, \$10)	4
(\$20, \$20)	3
(\$10, \$30)	2
worst (\$0, \$0)	1

Method of backward induction

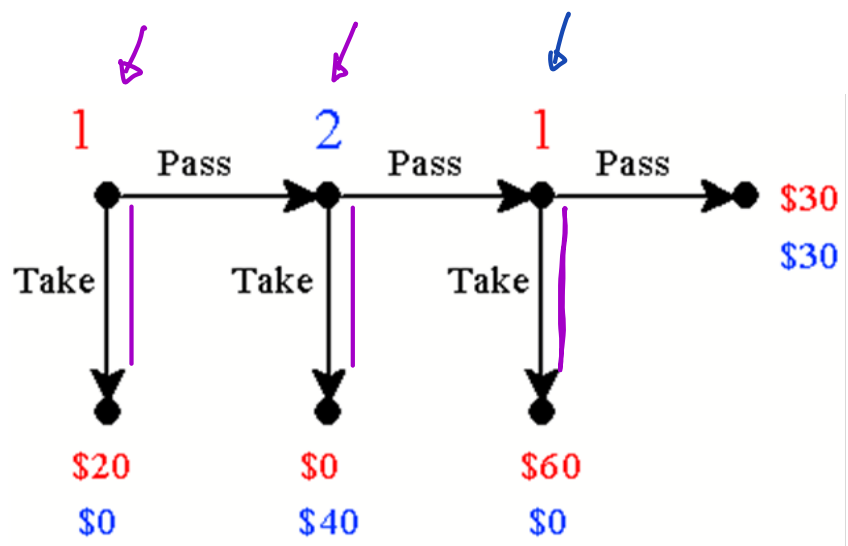
Suppose that Player 2 is fairness-minded and averse to greed:

	Utility
best (\$20, \$20)	4
(\$10, \$30)	3
(\$0, \$0)	2
worst (\$30, \$10)	1

Centipede Game

- A referee put \$20 on the table.
- Player 1 can take it and end the game or Pass.
- If Player 1 passes, the referee adds \$20 to the pot and Player 2 can take it and end the game or Pass.
- If Player 2 passes then the referee adds another \$20 to the pot and Player 1 can take it and end the game or Pass.
- ... and so on.
- At the last move the active player can take the pot for herself or can Pass, in which case the pot is divided equally between the two players.

The case of 3 moves:



Suppose :

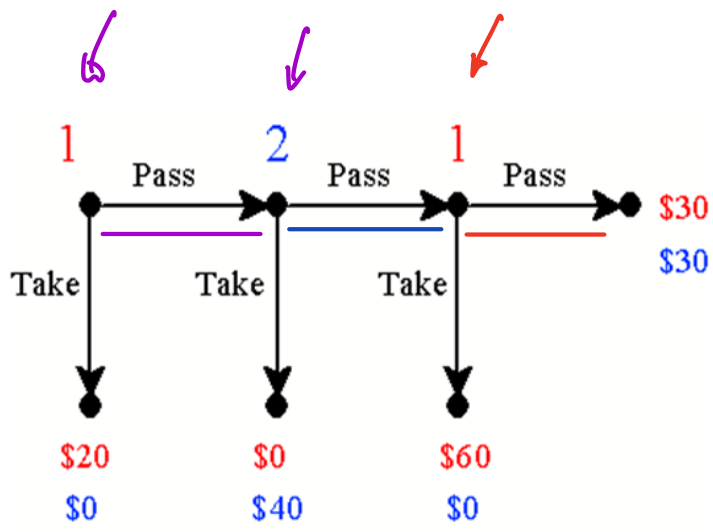
1 is selfish and greedy

best $(\$60, \$0)$
 $(\$30, \$30)$
 $(\$20, \$0)$ *
 worst $(\$0, \$40)$ *

Suppose :

2 is also selfish and greedy

best $(\$0, \$40)$ *
 $(\$30, \$30)$
 worst $(\$20, \$0), (\$60, \$0)$ *



Suppose that Player 1 is fairness-minded:

- Utility
- best $(\$30, \$30)$ } *
 - $(\$60, \$0)$
 - $(\$20, \$0)$ *
 - worst $(\$0, \$40)$

Suppose that

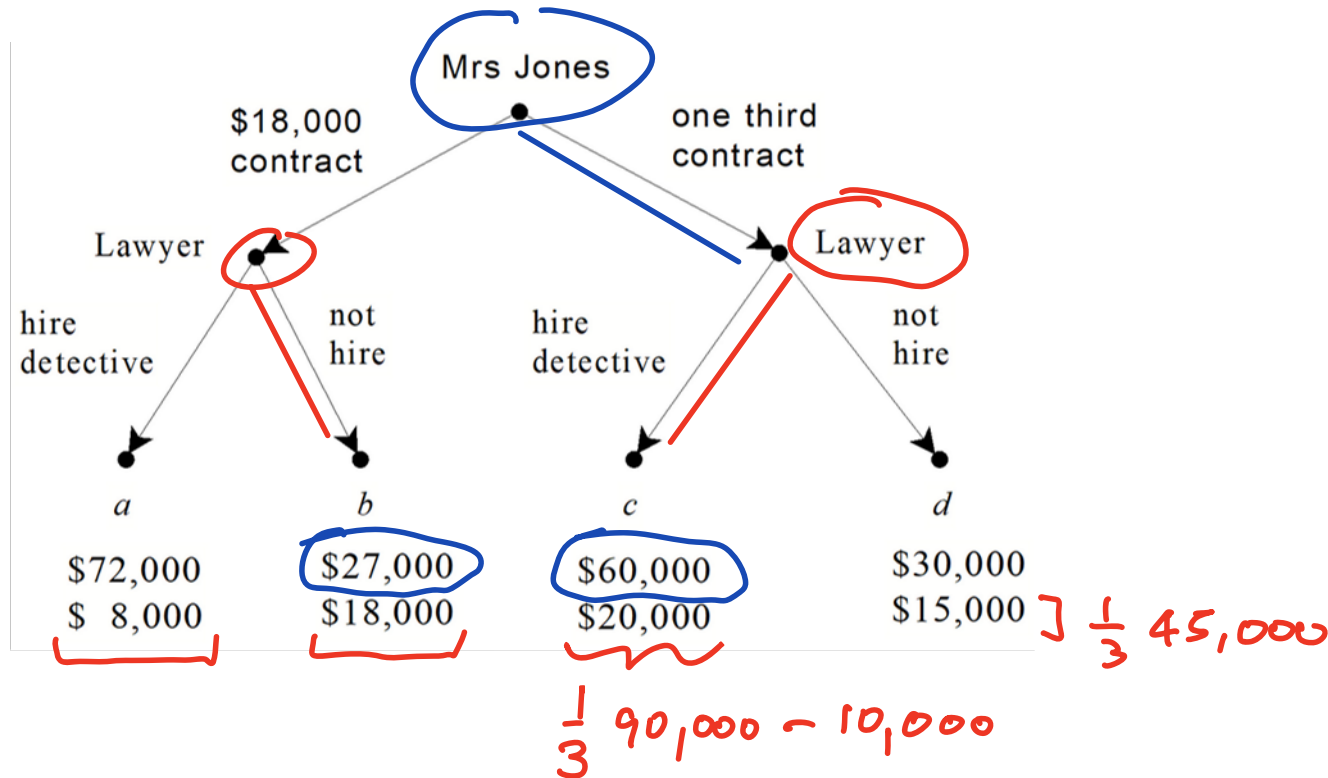
$$(\$30, \$30) \underset{2}{>} (\$0, \$40)$$

Suppose that Player 2 is also fairness-minded:

- Utility
- best
 - worst

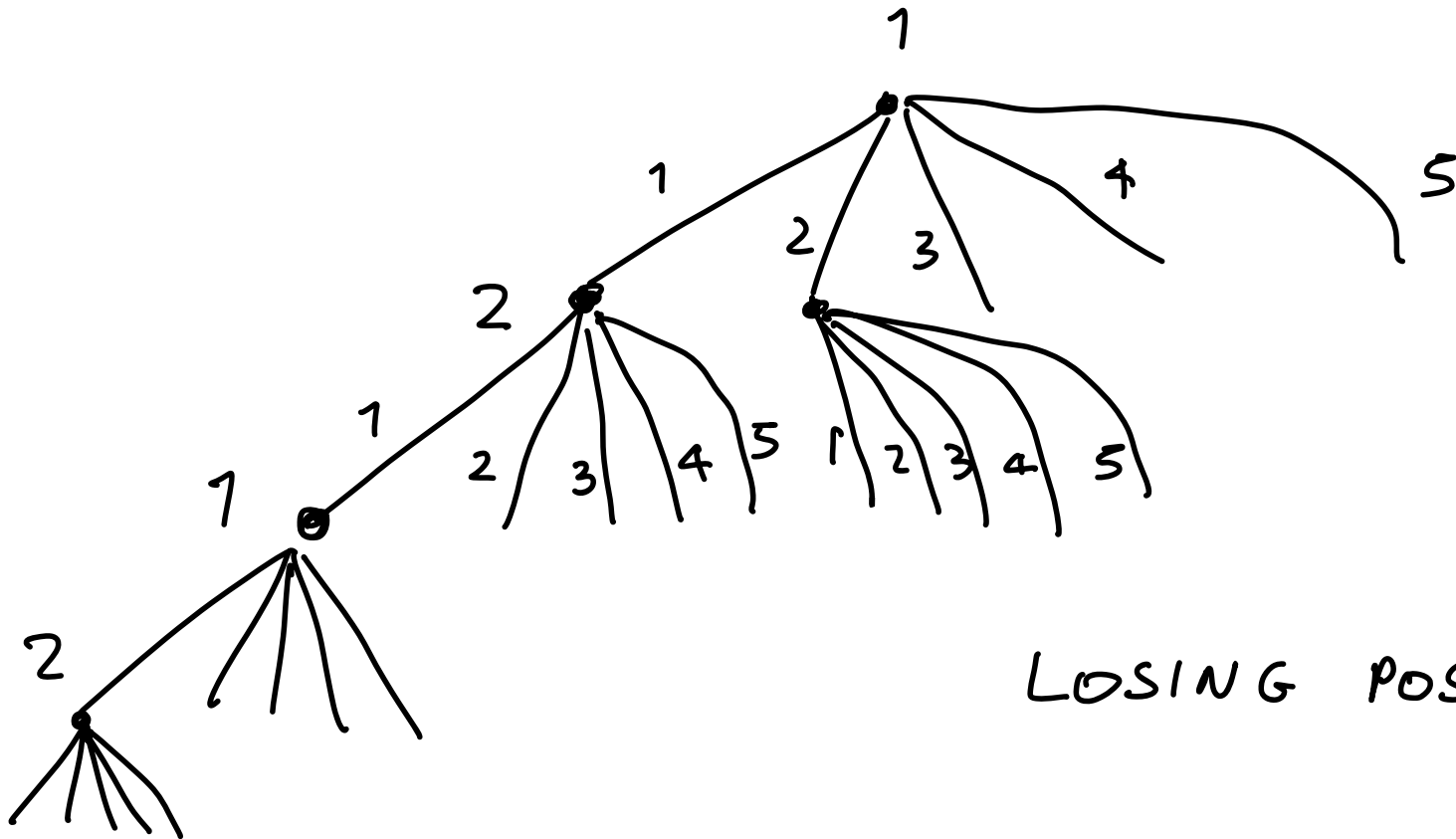
A divorce

Mrs. Jones is seeking a divorce from Mr. Jones. Under the terms of her prenuptial agreement, her settlement will be **\$90,000** if she can prove that Mr. Jones had an affair, but **\$45,000** otherwise. Her lawyer, acting as her agent, can indeed prove the affair but only if he hires a private detective for **\$10,000, which he will have to pay out of his own pocket**. The lawyer has offered Mrs. Jones a choice of two contracts. One contract involves a **flat payment to the lawyer of \$18,000**, regardless of the outcome. The other contract involves a fee equal to **one third of the settlement**. What contract should Mrs. Jones choose?



Backward-induction solution

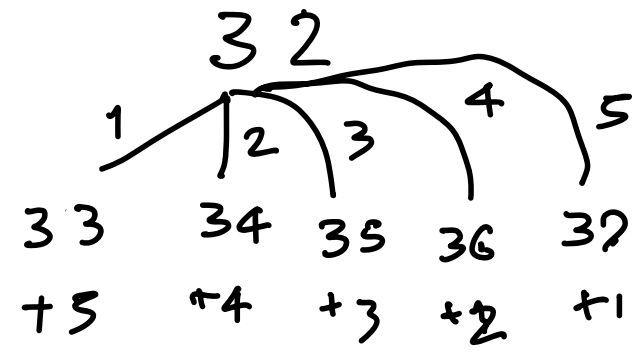
The race to 38. Players 1 and 2 take turns choosing a number from the set {1,2,3,4,5}. The first player to bring the total sum of the chosen numbers to 38 wins.



LOSING POSITIONS

2 8 14 20 26

Player 1 has a winning strategy: • start with 2



• then at each later stage

if player 2 picks n you pick $(6-n)$

Player 1: 2 2 5 3 4 1 5 3 8 1 wins

Player 2: 4 1 3 2 5 1

Player 1: 2 $\textcircled{1}$ ^{mistake}

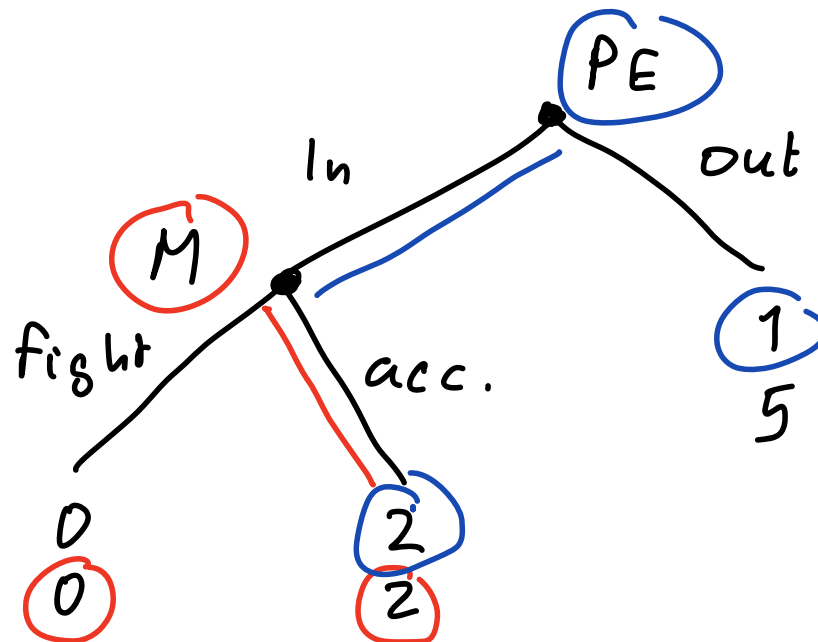
Player 2: 4 1 from here on 2 can win
by picking $(6-n)$ where
 n is the number chosen
by Player 1

A monopolist and a potential entrant

		Monopolist	
		fight	accommodate
Potential entrant	In	0, 0	2, 2
	Out	1, 5	1, 5

Monopoly profit is 5

Alternative investment yields 1 to PE



A chain-store (monopolist) and many potential entrants

The chain store is a monopoly in n towns. There are n potential entrants, one in each town. They make decisions sequentially with perfect knowledge of what happened in the past.

