

Problem

Two prominent fruit vendors, Bob and Alice, compete for customers at a marketplace. Bob and Alice must simultaneously choose to sell only one type of fruit. Both can sell apples, bananas, and oranges and want to maximize their profit, but they are affected by the other's decision. Below is the payoff matrix outlining the potential outcomes for each player based on their strategic choices. What is the difference between Bob's payoff and Alice's payoff?

Game table	Alice (apples)	Alice (bananas)	Alice (oranges)
Bob (apples)	-3	-2	6
Bob (bananas)	2	0	2
Bob (oranges)	5	-2	-4

Solution

This requires using Game Theory to decide the strategy each player will adopt.

What you want to do is select the minimum value for each row (i.e., the minimum row value) and the maximum value for each column (i.e., the maximum column value).

Game table	Alice (apples)	Alice (bananas)	Alice (oranges)	Minimum values
Bob (apples)	-3	-2	6	-2
Bob (bananas)	2	0	2	0
Bob (oranges)	5	-2	-4	-2
Maximum values	5	0	6	

Then, you want to determine the minimum of the maximum values in the maximum values row (i.e., minmax). In this example, this is 0. Additionally, you want to determine the maximum value out of the minimum values in the minimum values column (i.e., maxmin). In this example, this is 0.

Therefore, Bob and Alice will both choose to sell bananas, resulting in a payoff of 0 for both. As a result, the difference between their payoffs is **0**. A game with a fair value of 0 is also considered a fair game.

Answer: 0