

MATH 1300, Mathematical Explorations

Games

References and resources

[Wikipedia: Brussels Sprouts](#)

Assignments

1. The game of impartial cutcake is a two-player game with the following rules. We start with an $m \times n$ chocolate bar. (So, for example, a chocolate bar which is divided into three squares in one direction and 4 in the other.) The two players take turns taking a piece of chocolate and breaking it into two along one of the straight lines. (So, for example, the first move could break the 3×4 chocolate bar into a 1×4 and a 2×4 . The second move could take the 1×4 piece and break it into a 1×1 piece and a 1×3 piece.) The first player who can't make a move loses. At this point there will be mn 1×1 pieces. Does one of the players have a winning strategy? Which one? (Hint: try some small cases and count the number of moves. Can you predict what the number of moves will be in a general case? How does the parity of that number (whether it's even or odd) affect the result of the game?)
2. Look up the game Brussels Sprouts on Wikipedia. Try playing a few games, keeping track of the number of moves. Explain Wikipedia's argument that the game has a predetermined number of moves in your own words. How does this relate to the previous problem?

Follow-on activities

Brussels Sprouts

Chomp