Michigan Epsilon Chapter of Pi Mu Epsilon

Problem of the month: October 2019

A pebble game

Lily and Bharat play a game. They take turns (Lily goes first), and they start with 1000 pebbles on the table. On a player's turn, assuming there are N pebbles on the table, the player will remove one or more pebbles so that the new total is either $N - 1$ or $\lfloor \frac{N}{2} \rfloor$ (the player gets to choose which one). Whoever is able to remove the last pebble is the winner.

One of the players has a winning strategy. In other words, that player has a plan that will allow them to win no matter what the other player does. Which player has the winning strategy? Justify your answer!

Note: $\lfloor x \rfloor$ is equal to x if x is an integer, and otherwise $\lfloor x \rfloor$ is the largest integer that is less than x. So $\lfloor 7 \rfloor = 7$ while $\lfloor 2.4 \rfloor = 2$.

Please turn in your solutions to Patrick Bennett, by noon on **Thursday October 31, 2019**. Strive for clarity, neatness and legibility! Solutions may be turned into the Math Dept office in **3319 Everett Tower**. Please include your name and email address. Electronic submissions may be sent to **patrick.bennett@wmich.edu**. If you are currently taking a math class, please include the instructor's name and the course number.

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