

Competition Preparation for Saudi Arabia Team

2021: Level 4

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Homework: Week 1

Problems:

- (Easy) On two piles there are initially m and n coins respectively. Two players, A and B take turns removing at least one coin from one of the piles. Player A starts first. For which values of m and n will player A have a winning strategy and for which m and n will player B have a winning strategy if:
 - the player who takes the last coin wins,
 - the player who takes the last coin loses?
- (Medium) Can a 10×10 board be covered by L -tetrominoes (that can be rotated or flipped)?



- (Hard) Let $a, b > 1$ be odd positive integers. A board with a rows and b columns without fields $(2, 1)$, $(a - 2, b)$ and (a, b) is tiled with 2×2 squares and 2×1 dominoes (that can be rotated). Prove that the number of dominoes is at least:

$$\frac{3}{2}(a + b) - 6.$$