Explorations in Modern Mathematics 11008
12:05 MWF
Quiz 1

In the (original) Pennies and Paperclips game, if the pennies are placed in the same colored squares, then Penny will win.

Proof:

The rules of the game are that the pennies each take up one square and that the paperclips must take up two adjacent squares, placed horizontally or vertically. The paperclips and pennies cannot overlap. The board is divided into 16 squares, and the squares are colored in a checkerboard pattern: eight grey squares and eight white squares, none of which lie alongside a square of the same color.

If the pennies are placed on squares of the same color, two white squares for example, then remaining for the paperclips are six white squares and eight grey. Since each paperclip, by rule, has to cover two adjacent squares, each paperclip would cover one white square and one grey. By the time six paperclips are placed, each paperclip covering one white and one grey square, there are two grey squares remaining. And as we know, these grey squares aren't adjacent and therefore can't be covered by the remaining paperclip, so Penny wins.