UW Math Circle

November 5, 2015

Homework

1. A knight begins on one square of a chessboard, makes some number of moves, and eventually returns to the same square. What can you say about the number of moves that the knight made?

2. Twenty five boys and twenty five girls are sitting on a round table. Is it possible that every person is sitting next to a boy and a girl?

3. Can you fill in the expression 1__2__3__4 = 0 with + or - signs to make it true? What about the expression 1__2__3__4__5__6__7__8__9__10 = 0?

4. A grasshopper lives on an infinite number line. She started at 0, then jumped 1 step to either the left or the right. On her next jump, she jumped 2 steps to the left or right. Then 3, then 4, . . . , then 2015. Could she end up where she started?

5. Somewhere in the middle of the ocean, 10 blue, 15 green, and 20 red chameleons are on an island. Whenever two chameleons of different colors meet, they switch to the third color (so if a blue and a green met, they would turn red!). Could all the chameleons eventually be the same color?