UT Arlington Mid-Cities Math Circle $(MC)^2$
Games II

Problem 8. There are 20 points on a circle. Players take turns connecting two out of these 20 points by segments so that the new segments do not intersect segments that are already drawn. The player who cannot draw a segment loses. Define a winning strategy. Create similar problems with different starting numbers of points.

Problem 9. Ten 1's and ten 2's are written on a blackboard. In one turn a player may only erase any two figures. If the two figures erased are identical, they are replaced with a 2, if they are different, they are replaced with a 1. The first player wins if a 1 is left at the end and the second player wins if a 2 is left.

Problem 10. A knight is placed on square $a1$ of a chessboard. Players alternate moving the knight either two squares to the right and one square up or down, or two squares up and one square right or left (the usual knight moves but in restricted directions). The player who cannot move loses.

Problem 11. There are three piles of stones. The first contains 50 stones, the second 60 stones, and the third 70. A turn consists in dividing each of the piles containing more than one stone into two smaller piles. The player who leaves piles of individual stones is the winner.

Problem 12. There are two piles of candy. One contains 20 pieces, and the other 21. Players take turns eating all the candy in one pile, and separating the remaining candy into two (not necessarily equal) non-empty piles. The player who cannot move loses

Problem 13. There are two piles of 11 matches each. In one turn, a player must take two matches from one pile and one match from the other. The player who cannot move loses.

Problem 14. There are two piles of matches:
(a) a pile of 101 matches and a pile of 201 matches;
(b) a pile of 100 matches and a pile of 201 matches.

Players take turns removing a number of matches from one pile which is equal to one of the divisors of the number of matches in the other pile. The player removing the last match wins. (A number a is a *divisor* of a number b if b/a is an integer number.)