Sprouts.
The game starts with a fixed number of dots on the page. At each turn a player either draws a line between any two dots or draws a loop to connect a dot to itself and then a new dot must be drawn somewhere on that line. There are two restrictions:

1. The line cannot cross itself or be drawn through any previously drawn line or dot.

2. There can be at most 3 lines coming out of any one dot.

The player who makes the last possible move is the winner.
Play the game several times starting with two dots and then three dots. It might be fun to play a few games with one partner and then a few more games with another.
1. Are there any general strategies you found to be useful? (Discuss them with others.)

2. Which configurations really different?
Two configurations are *equivalent* if any line that can be drawn between any two particular dots can also be drawn in the other. For example, the following two configurations from a three dot game are equivalent. We see that $a$ is still connected to the same two dots and there is still a way to connect $a$ to $b$, $c$ and $d$, even though these lines will look different in the two diagrams.

![Two configurations from a three dot game](image)

In the two dot game of sprouts, how many *distinct* opening moves are there?

3. Can you find a winning strategy for either Player 1 or 2 in the two dot game?

4. If sprouts is played starting with $n$ dots, for some positive whole number $n$, will the game go on forever? If not, can you figure the maximum number of moves a game can last for?

5. For a game starting with $n$ dots, what is the minimum number of moves required for one of the players to win?