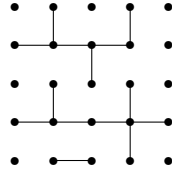
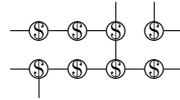


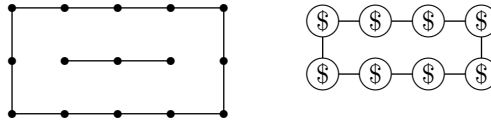
1. Squex is a game like Hex is played on a square board. A player makes a turn by placing a checker of her own color on the board. Squares on the board are *adjacent* if they share a side. Black's goal is to connect the top and bottom edges with a path of black checkers, while White wishes to connect the left and right edges with white checkers.
 - (a) In class, we discussed that the first player should win or draw a Squex position. Briefly describe the proof here.
 - (b) For what values of n is $n \times n$ Squex a win for the first player, and when is it a draw? Prove your answer by giving an explicit strategy for the first player to win or the second player to draw as appropriate.
2. (a) Consider the following Dots & Boxes position:



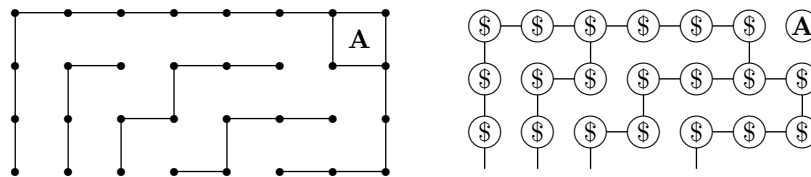
- i. Construct the corresponding Strings & Coins position.
 - ii. Determine if the person on move wants an even or odd number of long chains.
 - iii. Determine all winning move(s).
- (b) Nimstring is the same as Strings & Coins except the first player who cannot move loses. The winner is always the same as in Strings & Coins if there is a sufficiently long chain around.
- i. Find all winning moves in the following Nimstring position.



- ii. Draw the corresponding Dots & Boxes position. How many boxes will you get in a well played game from this position?
3. There are other Dots & Boxes (or Strings & Coins) positions where every move is loony. For example, there can be cycles:



and many-legged *spiders*:



How can you adapt the Long Chains Theorem and its proof to account for these positions?

4. Compose a Dots & Boxes problem and submit it along with a solution. The more challenging, the better, so long as you can analyze it.