Written project

Due date: November 9th, 5pm EDT. Late penalty of 1% per hour.

Format: A 1-2 page paper (including the illustration, $\frac{1}{2}$-1 page of text) turned in on paper during Friday November 9th class and turned in online to Blackboard by Friday November 9th 5pm. The late penalty is calculated based on the Blackboard time, but the main grade is based on the paper copy.

Description: Design a glow puzzle level! Actually, explain the mathematics of glow puzzle to a university administrator while presenting them with two glow puzzle levels of your own design: one that is solvable and one that is not.

Grading: 50% of the grade is obtained from a thorough and correct explanation of the mathematics of glow puzzle. Your description should include a clear description of what is and is not a glow puzzle, when a glow puzzle can be solved, and at least one perfect strategy (that always works on all solvable puzzles). Additionally, you should indicate (perhaps on the back, or upside down) which puzzle is solvable and which is not. 25% of the grade is obtained from a clear and compelling presentation. Your description should be easily readable and should communicate your understanding of the mathematics. In particular, it should be well-written, free from typos, and your puzzles should be neatly and cleanly drawn. 25% of the grade is obtained from creativity. Each of your submitted glow puzzles should be your own work. Attempt to make moderately hard puzzles. Note that the late penalty can bring your grade to a 0% if it is not turned in by Monday.

The written project counts as 5% of your final grade.

Sample project: On the next page a sample project is given. It would receive a B. Mathematically it is not too bad, but it could explain the rules a bit more precisely (are you allowed to skip lines?). It might also benefit from explaining that the odds do come in pairs (which can be explained in simple language, and is a little surprising). Presentation wise it is mostly fine, but perhaps it should explain how to play the puzzles on paper without a mobile phone. Creatively it is ok, but the grid puzzle is pretty dull. The difficulty strikes me as fine. Not too small to be guessed just by looking, but not so big that they get tired of playing during a single level.

Sample Written Project By Jack Schmidt

Glow puzzle is a popular mobile phone game based on a simple math problem. The board consists of bubbles connected by lines, and the object is to tap the bubbles in order so that each connecting line is lit up in turn. You win if you light up each line exactly once. This puzzle dates back to the 18th century where it was phrased in terms of taking a walking tour of seven bridges. Leonard Euler discovered a simple way to tell if such a puzzle could be solved: At each bubble (or island) count how many lines (or bridges) connect to it. The odd numbers (like 1,3,5) present a problem: every time you pass through this bubble (or island) you use two lines (or bridges), but with an odd number, there is one left over. Of course you must start somewhere and end somewhere, so that takes care of one pair of odds, but any others are an inescapable problem and the puzzle is not solvable. Two other mathematicians found strategies for solving the solvable puzzles. Fleury made the observation that the only way to lose was to divide the leftover edges into two separate puzzles with no connections between them. If the puzzle is solvable, then you are never forced to make such a bad move, and so you will win just by making any other move! Glow puzzle is a fun and simple game. Can you tell which of these puzzles is solvable?
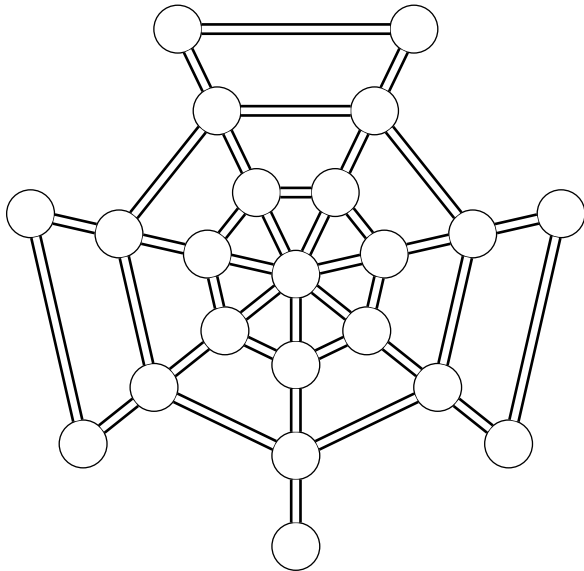
This one is solvable, but you have to start at the middle or the stick.
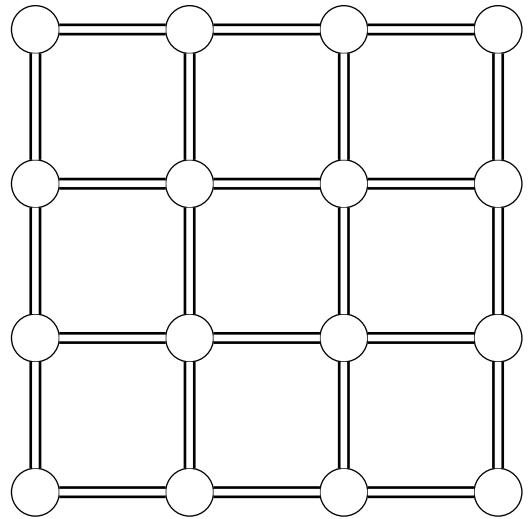
This one is not solvable, there are four pairs of odds, but only zero or one pairs is ok.