Honors 201: Mathematics and Texas Hold'em Problem Set 2

Due Tuesday April 8

1) For each natural number k consider the game $G(k)$ where we start with a pile of k matches. Alice and Bob take turns removing matches from the pile with Alice going first. At each turn the player may remove either 1 or 2 matches from the pile. The person who removes the last match loses.

For example, in $G(3)$ Alice has a winning strategy. She removes 2 matches and then Bob is forced to remove the last match.

a) Draw the game tree for $G(6)$ and determine who has a winning strategy.

b) Draw the game tree for $G(7)$ and determine who has a winning strategy.

c)[1] Come up with a conjecture about the values k where Alice has a winning strategy. Prove this if you can.

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[1]optional