MATH 1300, Mathematical Explorations

Hex

One 75 minute class

Activity

- Have the students play a few games of hex with each other.
- Have them think about/discuss why there are no draws.
- Discuss Strategy Stealing argument from Wikipedia:

> *In combinatorial game theory, the strategy-stealing argument is a general argument that shows, for many two-player games, that the second player cannot have a guaranteed winning strategy. The strategy-stealing argument applies to any symmetric game (one in which either player has the same set of available moves with the same results, so that the first player can "use" the second player's strategy) in which an extra move can never be a disadvantage.*
>
> *The argument works by obtaining a contradiction. A winning strategy is assumed to exist for the second player, who is using it. But then, roughly speaking, after making their first move - which by the conditions above is not a disadvantage - the first player may then also play according to this winning strategy. The result is that both players are guaranteed to win - which is absurd, thus contradicting the assumption that such a strategy exists.*

- Discuss non-constructive proofs and intuitionism. Can also mention the connection between the solution to Hex and Brouwer's Fixed Point Theorem.

References and resources

Wikipedia: Hex

Wikipedia: Strategy Stealing