

$(MC)^2$: Math Club as a Math Circle

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Goals for the Math Club

- Recruit math majors
- Develop community among math students
- Show students interesting new math
- Help students develop independent mathematical thought

Pizza & Problems

- Monthly meeting on a Friday afternoon
- Students work on a mathematical topic
- Attendance started with 2-4 students; now normally 10-20
- Attended by math majors and minors, plus a few others who are just interested in math (or free pizza)

How We Started

- List of classical, although interesting, problems
- Usually several different topics without a unifying theme
- Short in nature, e.g. Monty Hall Problem
- Students encouraged to present solutions

Successful activities

- Open-ended ideas
- Many possible questions to explore
- Accessible and interesting to students at a variety of levels

It took us a couple semesters to realize that we were running a math circle.

Stacking Cups (from the 2019 MathFest JRMF)

- Start with five cups in a row.
- Moving one stack at a time, try to turn these five stacks into one stack.
 - A stack moves as many spaces as there are cups in the stack
 - A stack cannot land in an empty space.



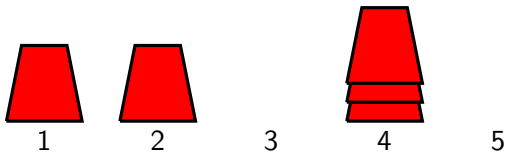
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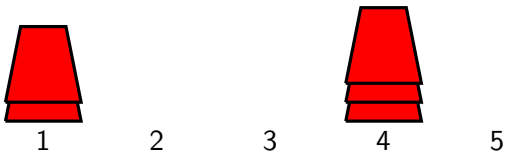
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1

2

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4

5

Additional Questions

- Can we still stack the cups if we start with a longer line?
- Is it possible for the final stack to be anywhere on the line?
- Can we still stack the cups if we arrange them on a grid?
- Is there more than one way to solve this? Is one way better?

Students' Questions

- What if we start with 51 cups in a row?
- Can we find a strategy for n cups in a row?
- Can we prove inductively that an algorithm exists for stacking n cups in a row?
- On a square grid, what should the rules be about measuring distance?
- Assuming we can move cups along the edges of a graph, can we draw a graph for which no stacking algorithm exists?

Benefits to Students

- Develops persistence and problem-solving in a low-pressure setting
- Builds community and encourages teamwork
- Gives the students the opportunity to ask mathematical questions instead of being given them
- Connects students to math faculty outside the classroom

All of these are important goals of a math program that are difficult to achieve in the formal curriculum.

Student Projects

- Super Tic-Tac-Toe allowed students to question different strategies in game theory, and they began modifying the game on their own to test different strategies.
- After we introduced the students to SET, we took some students to a conference and didn't bring SET decks. They made their own out of notebook paper.
- After we talked about COUNTDOWN, one of the students wanted to do a research project on it. She presented at the MAA Texas section meeting.