OMMC 2024 Sample Problem Set 1

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Instructions

1. This is a 3-question, untimed sample problem set that can be worked on with as many people as you want.

2. All answers are rational numbers (not necessarily integers).

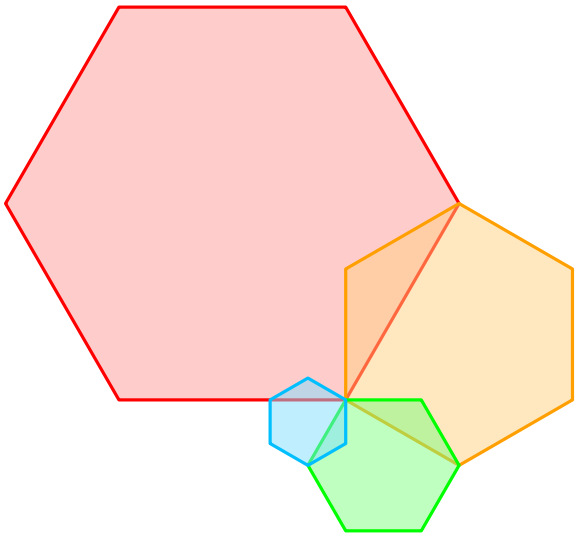
3. Open discussion of any aspect of the test is allowed and encouraged. You can ask for hints and discuss your thoughts with other people.

Any questions on the above should be emailed to ommcofficial@gmail.com. With that, good luck!

PROBLEMS

1. Given that there is a unique even number $n < 1000$ that can be written as the difference of two positive perfect cubes in at least two ways, find n.

2. In the following diagram, the cyan hexagon has area 4. Find the total shaded area.



3. In a regular 20-gon $A_1A_2 \ldots A_{20}$, diagonal A_1A_{11} is drawn. A frog starts on A_4. Each step, it chooses to go to an adjacent vertex at random. What is the probability of being on A_4 after 11 steps?