

Math4All: Discovering Combinatorics

Course Description:

This class will allow students to find creative ways of counting various quantities and master every AMC and AIME combinatorics problem in existence. The course will target various counting strategies and cover a very powerful and handy proof strategy. By the end of this class, students will be able to use these new strategies to tackle unfamiliar problems in combinatorics.

Week 1: Basic Counting Methods

Week 2: Principle of Inclusion and Exclusion

Week 3: One-to-one Correspondences

Week 4: Pigeonhole Principle

Week 5: Expected Value

Week 6: Induction and Recursion

Week 7: Invariant

Week 8: Conditional Probability

Week 9: Events with States

Week 10: Generating Functions and Graph Theory

Resources: None required, but it is highly encouraged to find problems from external sources

Format: Warm-up will be given for the first five minutes of class. Then, the material for the class will be covered with slightly harder questions than the warm-up, each progressing in difficulty. Finally, the class will end with a proof question. Weeks 4, 7, and 10 will feature retro questions from the previous weeks and will take place after the warmup.