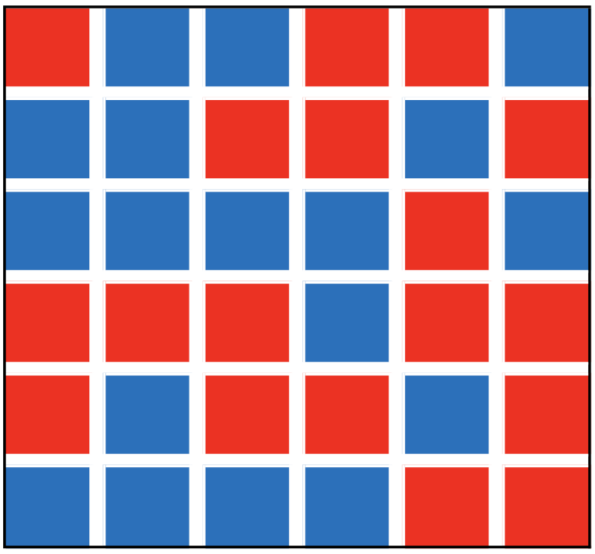
APSU Math Problem of the Week

Problem #9: Packing and Cracking

Submission Deadline: 11/5/2021 by 12pm to
Dr. Brad Fox in **MMCS 109** or by email to **foxb@apsu.edu**

Gerrymandering is a mathematically-based political issue in which after every census, political actors redraw voting districts by grouping together geographical blocks of voters with the malevolent goal of benefiting their party politically. Below is a square-shaped state consisting of 36 precincts, each of which votes entirely for the blue or red party with a total of 18 for each party. Notice that the state could very fairly be divided with 2×2 squares to make 3 blue districts (at least 3 precincts are blue), 3 tied districts (2 of each color), and 3 red districts (at least 3 red precincts).

But that's boring, so instead you are allowed to use any of the 5 tetris blocks and their reflections/rotations to create 9 connected districts consisting of 4 precincts each (make sure none of your districts are disconnected). Your goal is to pick either the blue or red party, and then gerrymander the state so that your party wins as many districts as possible. To determine the winner this week, you earn 3 points per winning district, 1 point for each tie, and 0 for losing districts.



Feel free to take this printout, or find each Problem of the Week by scanning this:

Complete the problem each week for a chance to win a prize

Rules:

1. Any APSU student can submit a solution individually, or work can be done in a small group of 2 or 3 students.
2. Solutions must be justified when appropriate to be considered correct.
3. Submissions can be made to Dr. Brad Fox (MMCS 109) or electronically to foxb@apsu.edu
4. Problems will be posted each Friday afternoon with submissions due by the following Friday at 12pm. Solutions and the weekly winner will be posted once the deadline has passed.
5. One correct submission (whether submitted individually or as a group) will be randomly chosen to win a prize such as gift cards, Galois Math Club t-shirts, and APSU CoSTEM swag, in addition to receiving the glory of having their success published on this webpage.
6. Faculty and other non-students can submit solutions, but are not eligible for prizes.