University Math Challenge

PROBLEM

October 23, 2019 to November 22, 2019

Alice draws 10 distinct lines in the plane, any pair of which may intersect, or may be parallel. Each line divides the plane into two half-planes, one on each side of the line. For each line, Alice chooses one half-plane whose border is that line, and shades the half-planes she chooses. Bob seeks to mark in the plane some number of points, n, so that each of the 10 shaded half-planes contains at least one marked point inside it. For each choice of the 10 lines and 10 half-planes, find the minimal possible value for the number of points n required to do this. Justify your answer.

Direct any questions to
Grant Lakeland (OM 3226) or Gregory Galperin (OM 3361)

Rules & Rewards

- Any undergraduate currently enrolled at EIU is eligible to participate.
- Each solution is to be the work of one individual and is to be submitted with the solver's name, year in school, email address, local address, and home address.
- Each solution is to be written or typed and is due in the main Mathematics Department office (OM 3611) by 2:00pm, Friday, November 22, 2019.
- Entries will be judged on the basis of clarity of exposition and elegance of the solution. That is to say, the *explanation* is more important than the answer.
- An award of $50 will be given for the best solution. In the case of a two-way tie, the award will be evenly split. If there are more than two 'best' solutions, a drawing will be held for the reward. In the case no award is made for this week's challenge, $50 will be added to the next week's award.
- Names of all solvers will be posted on the Challenge of the Month bulletin board and on the Challenge homepage: `http://www.eiu.edu/math/challenge.php`