

Problem of the Week #11

Assigned: 1300, 12 NOV 10

Due: 1300, 18 NOV 10

Cadet Hat Problem

MAJ Evans decides he wants to make major changes to the MA103 validation test administered during beast barracks. He instructs cadets to bring their white and grey service caps to the examination, which will be administered separately to each new cadet company.

New cadets are told that when they report for the test, MAJ Evans will have the company stand in a single column and will arbitrarily place a white or a gray service cap on each new cadet's head (the other hat is kept out of sight). New cadets will be able to see the colors of the hats worn by all those standing to their front, but not their own hats or those worn by new cadets behind them.

In any order, the new cadets must then attempt to guess the color of their service caps. Other than their guesses, they cannot speak or confer in any way, verbal or nonverbal. If more than one of them guesses incorrectly, then all cadets in the company are doomed to a semester of MA103 (and MAJ Evans keeps the spare hats to add to his private collection). If one or zero new cadets guess incorrectly, the entire company validates.

Knowing the rules in advance, what strategy can the new cadets use that will ensure their success?

Solution by Francis Golding:

It is enough that the last in the column says WHITE if he sees an even number of white caps in front of him and GREY if odd. From then on working from the back of the queue, each cadet knows his own colour as soon as all cadets behind him have stated their colour.

With accurate counting only the last cadet in the column might have said the wrong colour.

Email solutions to Christopher.marks@usma.edu with subject line: POTW.

Solutions can be emailed in the form of: an email (plain text) no attachment, a word document, a mathematica file, an excel workbook, or a scanned adobe file of your work.

If none of these options work for you, you may drop a hardcopy off at my office TH239C, just annotate the time of submission.