






















Mad Hatter Mathematics

Extra Spicy Challenges

MHM1: This puzzle combines two of the hat games we played today:
spicy Three of Robin Hood's merry men are captured and lined up as we did in class. The sheriff shows the men five hats - three are black and two are white. The men did not prepare a strategy in advance. In turn, the men are asked their hat color. The man in the rear cries out that he does not know his hat color. The man in the middle, says the same. What does man at the man at the front of the line say?

MHM2: Complete the following chart for the "Pass or Correct" Hat Game:
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3 players	4 players	5 players (<i>super ridiculously spicy</i>)
<p>Hats chosen in speaking order</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  _____  _____  _____  _____ </div> </div>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  _____  _____  _____  _____  _____  _____ </div> </div>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  _____  _____  _____  _____  _____  _____  _____  _____  _____  _____  _____ </div> </div>

If all players play logically and perfectly, which of these hat combinations can be won? Indicate them with a "W" on the blank line. If the combination cannot be won, put an 0 on the line.

Bonus Challenge: Choose one of the games that cannot always be won, even if the players play perfectly if the last player guesses, what chance do they have of being correct? Hint: it is frequently far more than 1/2.

MHM3: There are 20 students standing in a classroom. Each has a red hat and a blue hat - each holds one hat in his/her hands and wears the other on his/her head. Ten of the 20 students are wearing the red hat and holding the blue (the other ten are wearing the blue and holding the red). You are standing in the room wearing a blindfold and earplugs, unaware of which students are wearing their red hats. You must create two groups of students, each group must have the same number of students-wearing-red-hats as the other group. You can only arrange the people and trade their hats, how can you create such groups?
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