An Investigation of Mathematical Hat Games

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This paper investigates patterns in the solutions of variations of three different “hat games,” and attempts to create generalized solutions. Hat games are logic problems phrased in terms of various configurations of people wearing hats, wherein the object is that some number of people is able to deduce their own hat color. Solutions are given to the original formulation of each logic puzzle. The original game, its solutions, and the variations from each game are compared and contrasted. For “Three Wise Men …With Hats!” the trials varied in the number of men playing and the proportions of the two colors of hats. Solutions for the variations of this game are summarized in four theorems, which are stated and proved. Also, three conjectures are given on further generalizations of this problem. This paper also has a cursory investigation of “The Hat Game” and “The Puzzle of 100 Hats.” However, less substantial conclusions were reached on generalizations of these two puzzles.

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