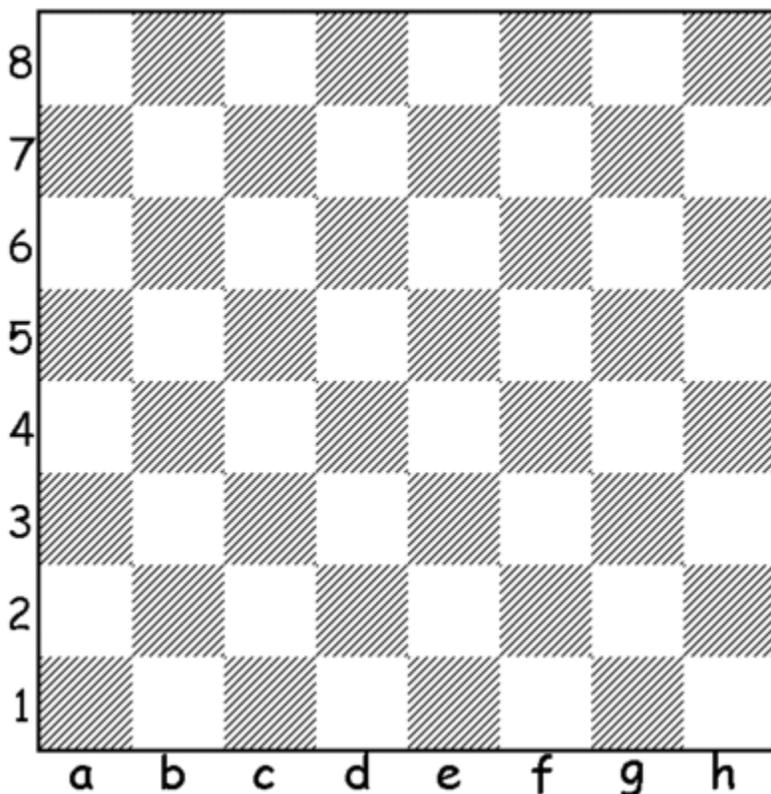


A Problem in the Game of Chess

Mahmood Alborzi, Ph.D.
Abadan Institute of Technology

In the old good days, 1346, when I was attending the military services with many other friends from Abadan Institute of Technology, we used to play chess in our garrison. I was never a good chess player, yet interested in the game. I used to buy the chess magazine for fun. There was a problem in one of the issues that I proved intuitively and wrote to the editor of the magazine. The editor wrote back, confirming that my proof was correct, and that they would have printed it in the October issue of the magazine that year. I did not follow it up, and never got the particular issue of the magazine. Many years later, as an Operations Research toy problem, I solved it again, but this time using Integer Programming.



The Problem:

“A man had claimed that he had arranged the chess pieces in a way that the king would have been stalemate if located in 15 positions. He is now trying to arrange the pieces so that the king would be stalemate in 16 positions. Can he potentially succeed? Prove if positive or otherwise. What is the maximum number of positions he may possibly find?”

The Correct Answer: Number of stalemate positions cannot exceed 15.

The Proof: Following is the intuitive proof.

Fact 1: We can divide the 64 squares on the chess board to sixteen 2x2 cells, by drawing three vertical lines and three horizontal lines.

Fact 2: King cannot be stalemated in two adjacent positions, otherwise he could move to the adjacent position if checked. Hence, any 2x2 cell can house only one stalemate position.

Fact 3: Out of the sixteen 2x2 cells one is occupied by the opponent king.

Result: The maximum number of stalemate positions would hence be 16 less 1, i.e. 15!