Chess Project

Chess[1] is too big to solve via DFS. But here is an endgame that is still pretty big but you *might* be able to solve it. It is Knight-Bishop endings[2].

Label the positions $11, 12, \ldots, 88$. Let the starting position be (just for definiteness) that white has a king on 11, a bishop on 12 and a knight on 13 and that black has a king on 88 and that it is white's move. Apply DFS to find if it is a win for white or a draw.

Comment: There are $64^4 \cdot 2$ or roughly 33 million positions and white may have over 20 moves (black at most 8) so you'll need a fast computer and good programming. (Actually half that as the bishop must stay on its color.)

Comment: If White ever loses a piece then it must be a draw.

Comment: If you use the eight-fold symmetry of the square you can knock down the number of positions by a further factor of 10/64. E.g., you can apply symmetry so that the white king is on one of a1,a2,a3,a4,b1,b2,b3,c1,c2,d1.

Comment: If this is too big you can try a 6×6 board.

Most of all, have fun – explore – take to heart the words of the founder of Theoretical Computer Science, Don Knuth:

> ...pleasure has probably been the main goal all along. But I hesitate to admit it, because computer scientists want to mantain their image as hard-working individuals who deserve high salaries. Sooner or later society will realise that certain kinds of hard work are in fact admirable even though they are more fun than just about anything else.

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[1]Some understanding of the basic rules of Chess is required here.
[2]Yes, chess fans will know that this is already known