Knights

In this assignment you will solve a classic sort of puzzle involving knights on a chessboard. The setup is a board (an 8×8 grid) that contains some pawns on some squares. A knight in chess can move two steps in one directions and one step at a right angle to the first direction.

The challenge is to answer whether or not it is possible for a knight in a given position to collect all the pawns via successive Knight moves. Every move must capture a new pawn, so, for example, if we start with 8 pawns then we should use 8 moves.

You will implement 2 or 3 functions in a file called `knights.py`.

The first function, `solvable`, takes a starting position for the knight and a set of positions for the pawns as arguments. It returns `True` or `False` depending on whether or not it's possible for that knight to capture all the pawns in consecutive moves.

The second function, `findstart`, takes a set of positions for the pawns as arguments. It returns a set of positions on the board where the knight could start and capture all the pawns in consecutive moves. If there are no good starting positions, then the return value will be an empty set.

The optional third function, `findpath`, takes a starting position for the knight and a set of positions for the pawns as arguments. It returns a list of positions that describes the specific moves the knight will make to capture all the pawns. If there is no path, then the return value should be `None`.

Representing the board

Assume that the board is 8 by 8 and the positions are denoted by a tuple `(x,y)` where `x` and `y` are integers from `1` to `8`. So, the lower left corner of the board is `(1,1)` and the upper right corner is `(8,8)`. Positions are also indicated by such pairs.

Use recursion!

You should think about the problem and look for a recursive solution.

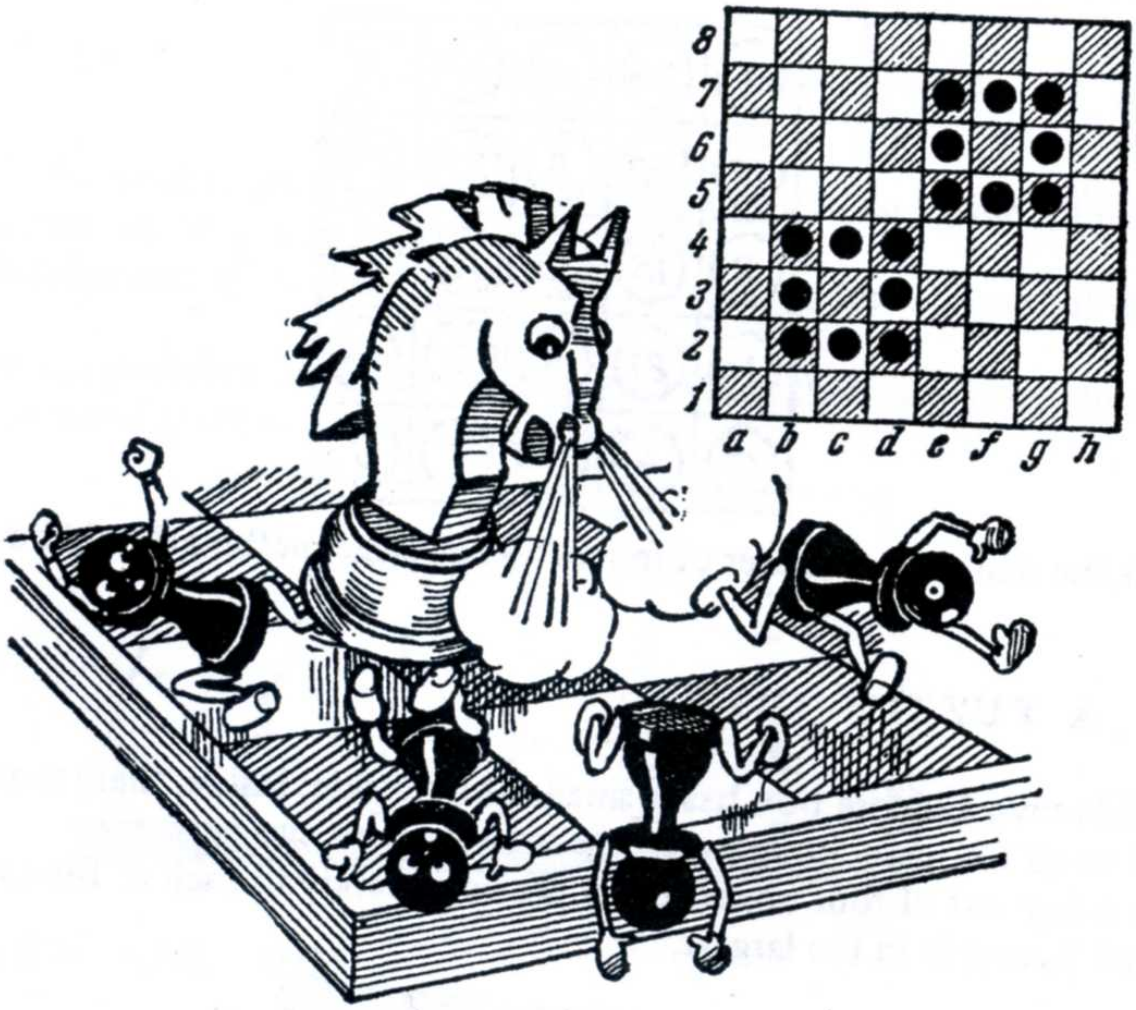
Submit your program

Submit your `knights.py` file. It should have the three required functions. Don't submit test files, but do write your own tests as you work.

Here is an interesting case that appeared in a classic book of puzzles.

110. KNIGHT'S MOVE

To solve this problem you need not be a chess player. You need only know the way a knight moves on the chessboard: two squares in one direction and one square at right angles to the first direction. The diagram shows 16 black pawns on a board.



Can a knight capture all 16 pawns in 16 moves?