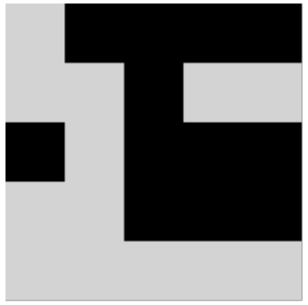
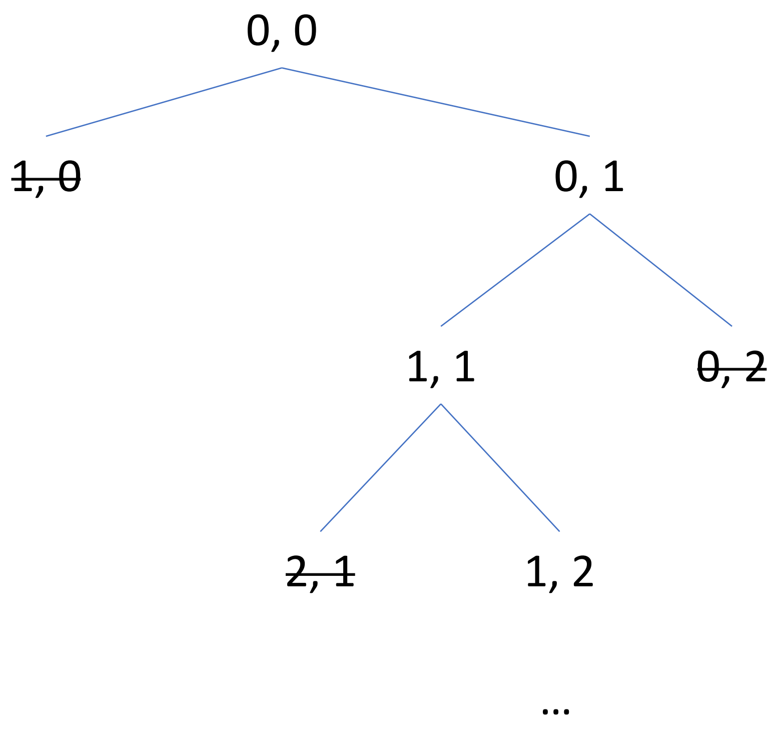
Search problems – day 2

- Last time – 2-way mazes (down and right only)
- Videos – Sudoku
- Problem bank – nqueens, programming contest
- Today – Triangle solitaire
- Lab - Clowns
- Problem set – TA lab schedule solver

- lots of problems to practice with
    - work them from the starter
    - don’t look at the solutions!!!

Tree of x,y positions moving through this maze



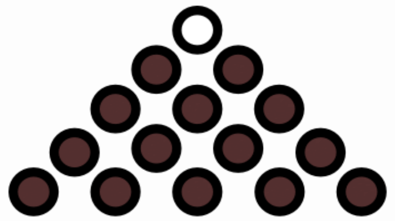


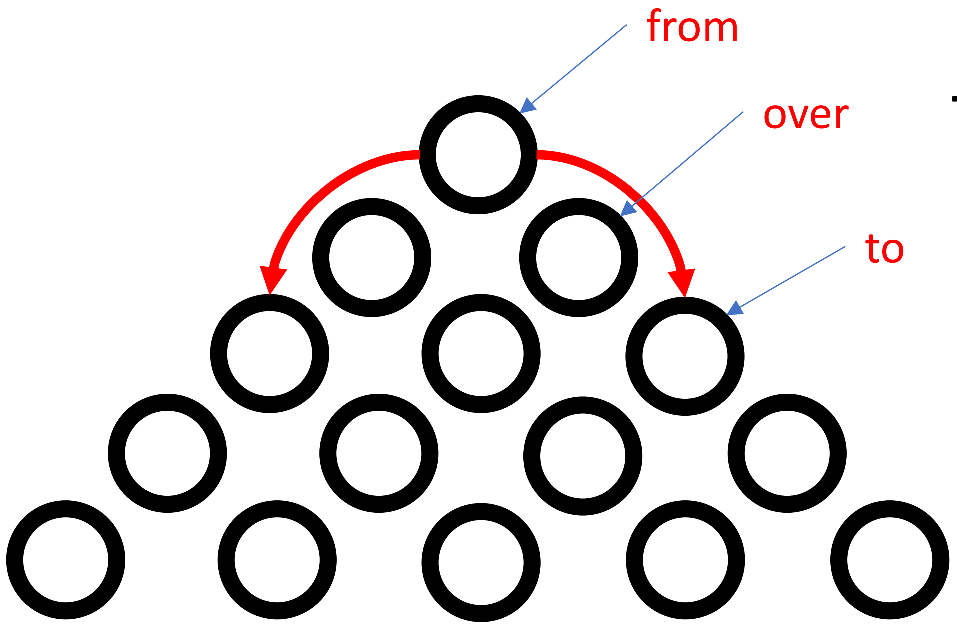
changing search state: current position

generated search states: down and right, UNLESS wall or edges

done: solved when reach lower right corner
can also run out of moves

Peg solitaire





Jump has

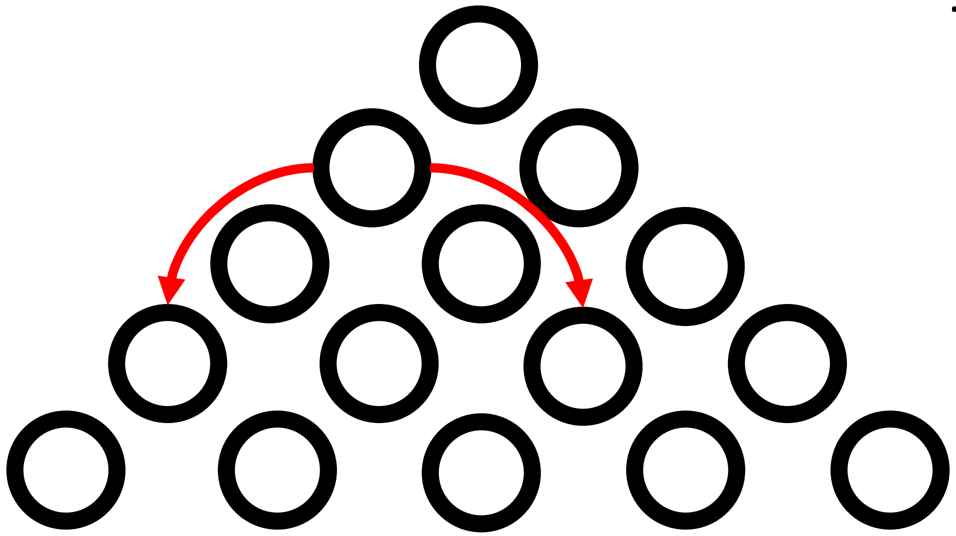
from, over, to

To be valid,

from is full

over is full

to is empty



Jump has

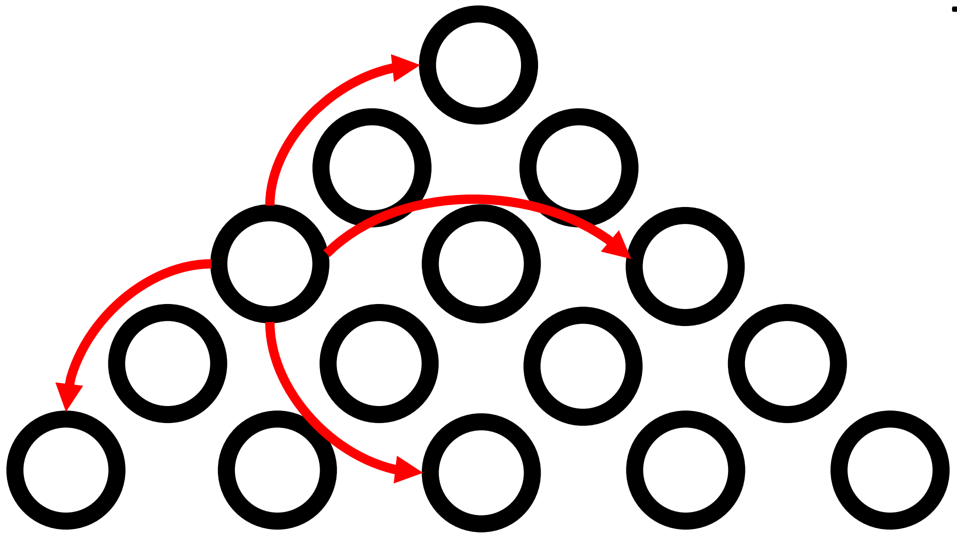
from, over, to

To be valid,

from is full

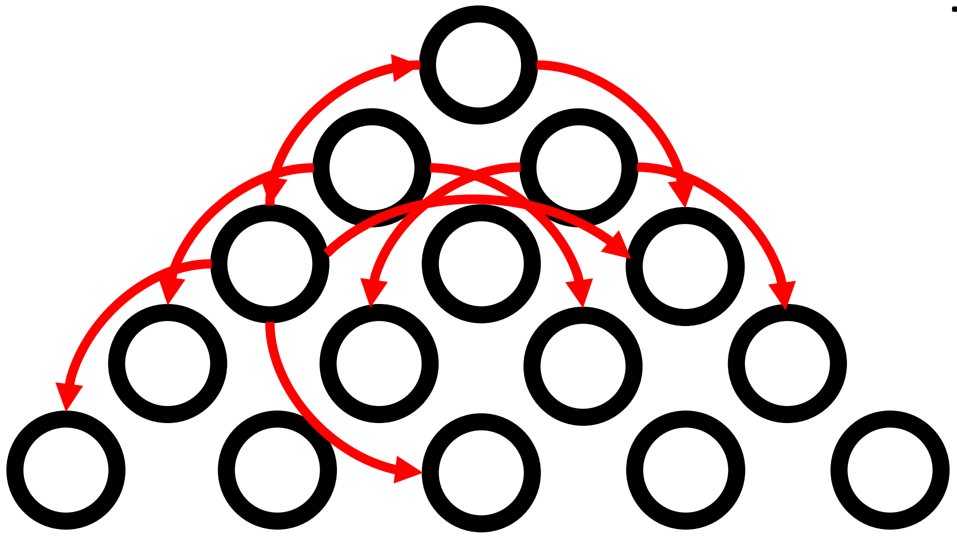
over is full

to is empty



Jump has
- from, over, to

To be valid,
- from is full
- over is full
- to is empty



Jump has

  from, over, to

To be valid,

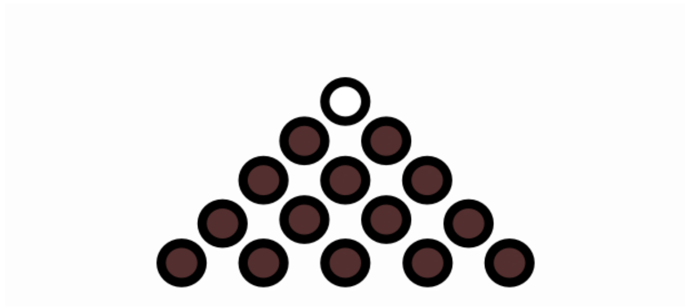
  from is full

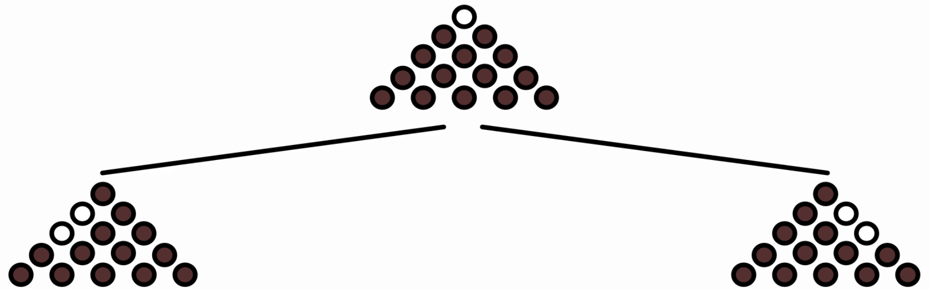
  over is full

  to is empty

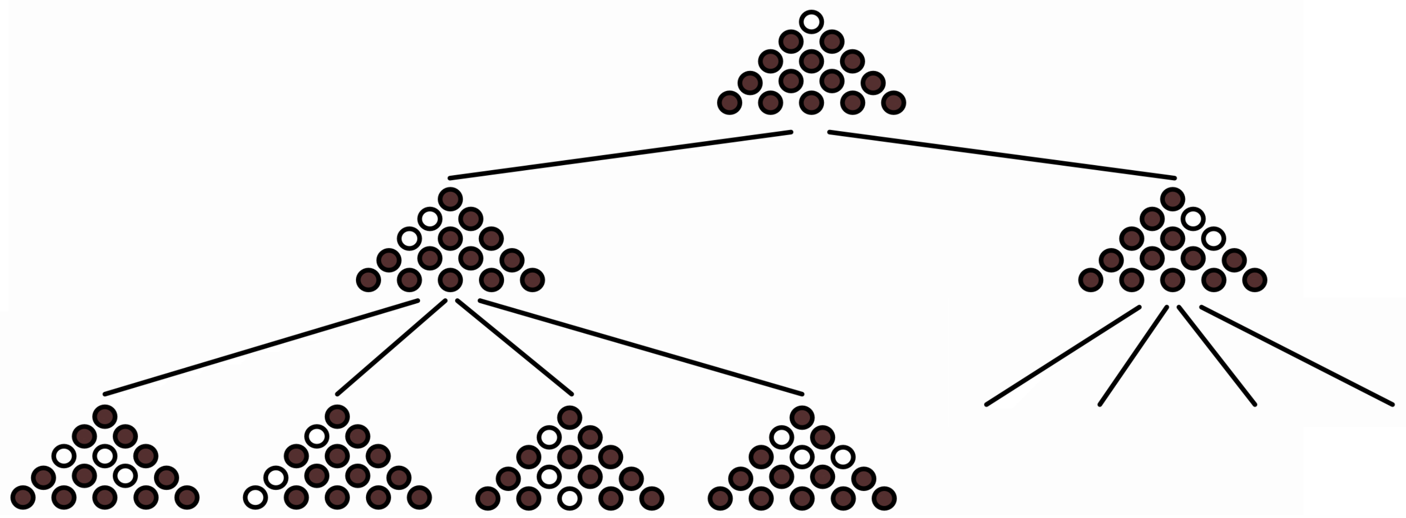
There are 36 possible jumps on the board

If we start here - what are possible next states?



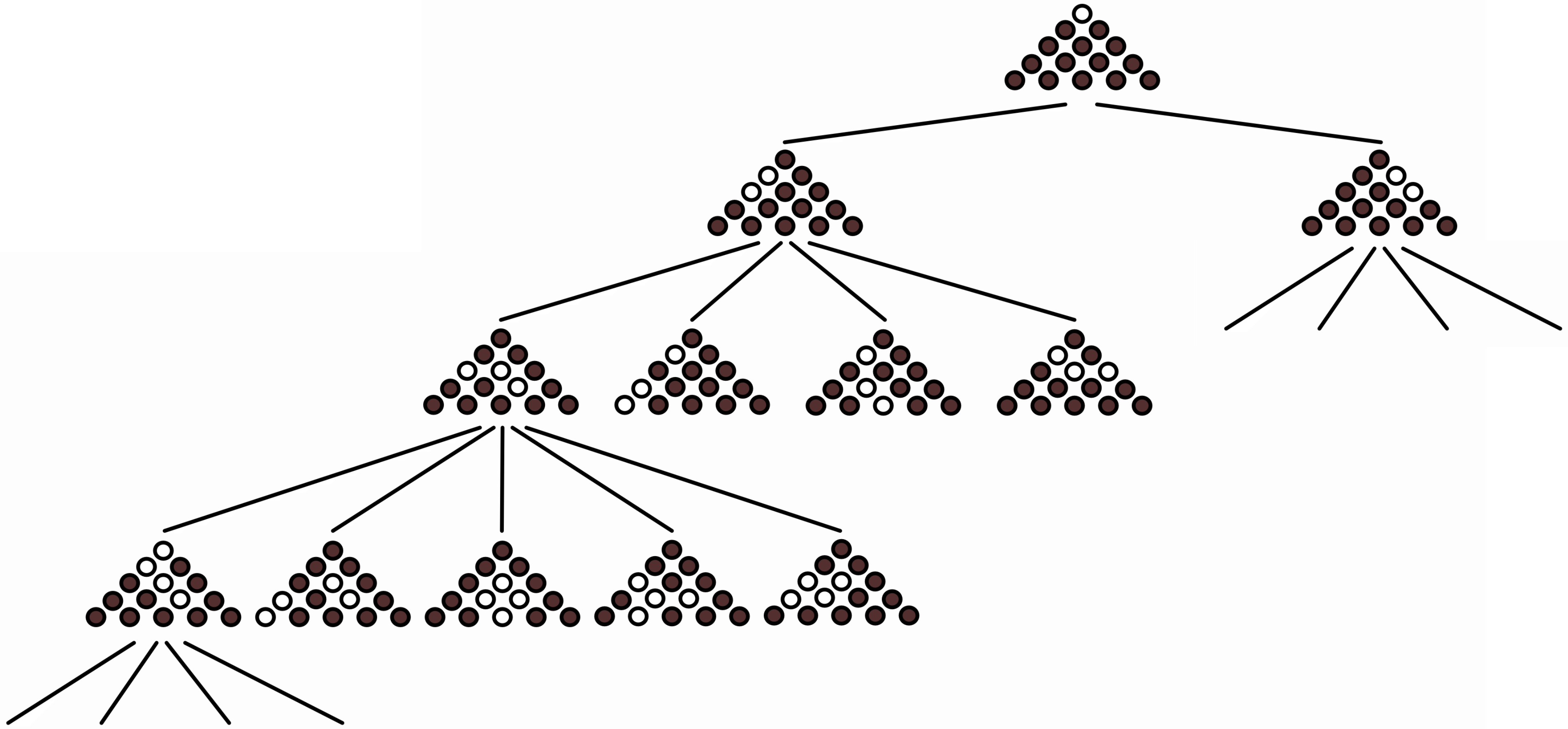


and after here?

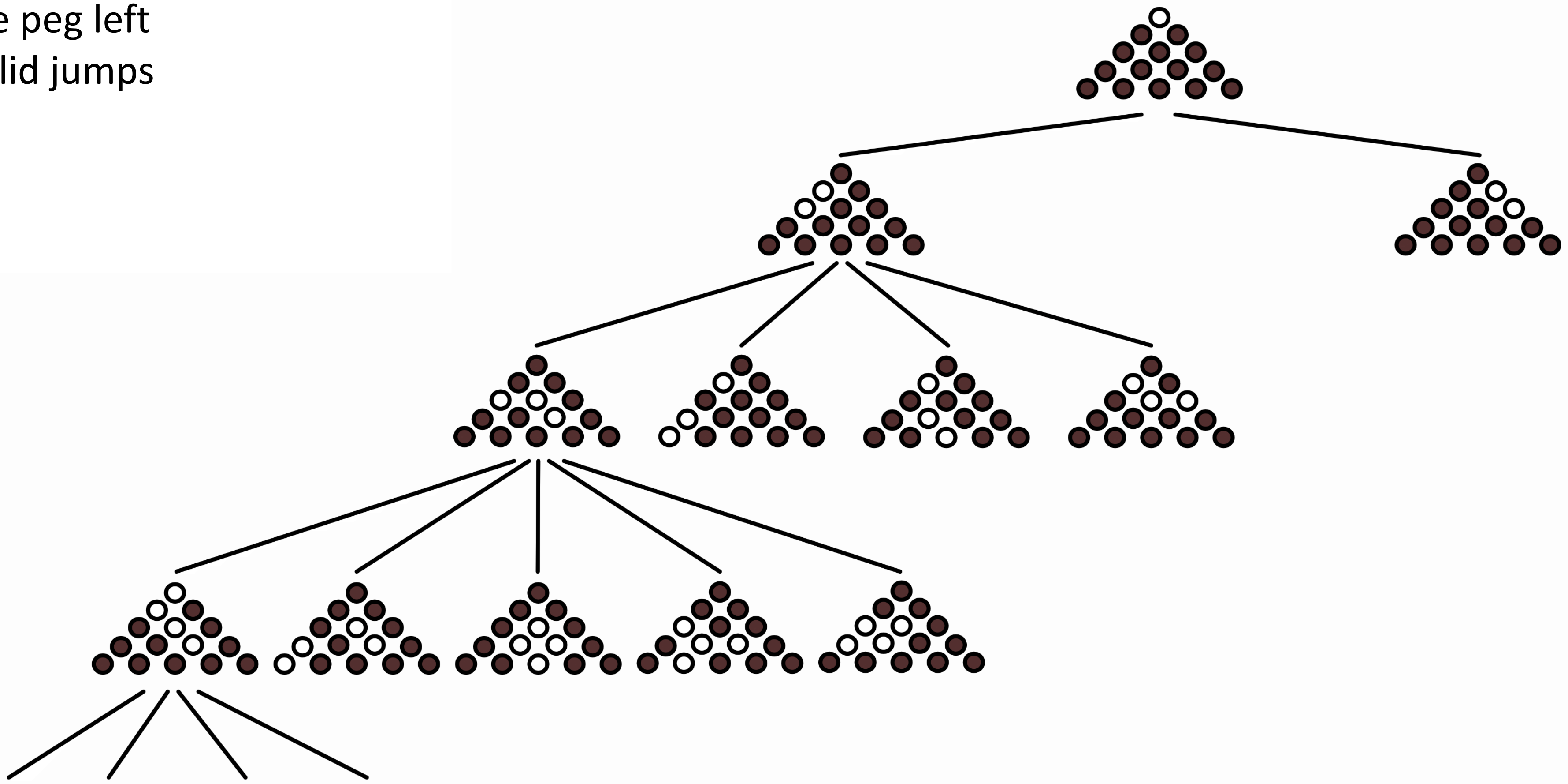


and after here?

What is CHANGING???



changing: what holes have pegs in them
next states: 36 jumps -> n valid jumps -> n new boards
done: only one peg left
or no valid jumps



```
(define (solve bd)
  ;; Termination argument:
  ;;  base: not possible to remove anymore pegs (solved or no valid jumps)
  ;;  reduction: make one of n valid jumps
  ;;  argument: making one jump at a time always reaches no more possible jumps
  (local [(define (solve-bd bd)
            (if (solved? bd)
                (list bd)
                (local [(define try (solve-lobd (next-boards bd)))]
                  (if (not (false? try))
                      (cons bd try)
                      false))))

          (define (solve-lobd lobd)
            (cond [(empty? lobd) false]
                  [else
                   (local [(define try (solve-bd (first lobd)))]
                     (if (not (false? try))
                         try
                         (solve-lobd (rest lobd))))]))]
    (solve-bd bd)))
```