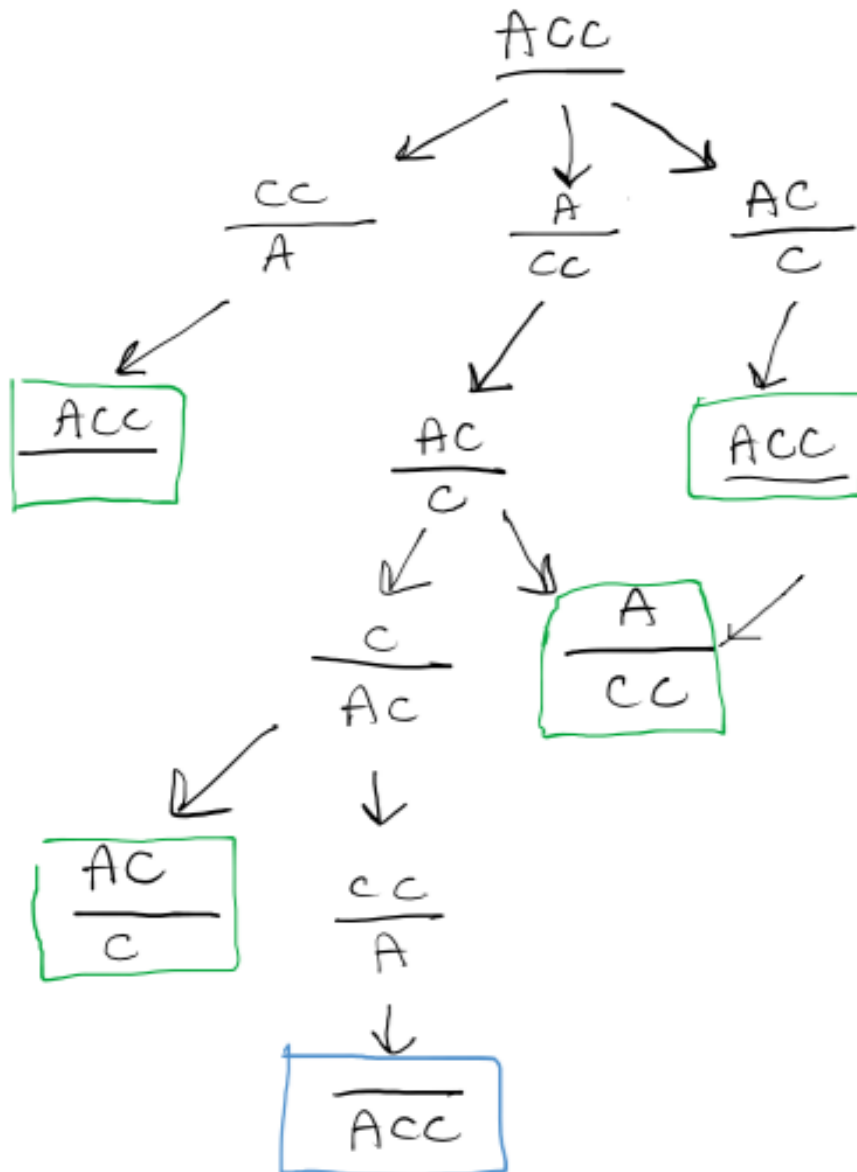


① Search Space: Problem 1

GOAL STATE = \overline{Acc}

Repeated State = state we've seen before



For the number of possible arrangements of eight queens on a chessboard. I would accept several different answers, so long as they are explained well.

- 1) $64 \text{ choose } 8 = 4426165368$. There are exactly 64 choose 8 ways you can place eight queens on the board. This is fine, but a little naïve.
- 2) $8^8 = 16777216$. I can put the first queen in any of eight slots in the first row. I can put the second queen in any of eight slots in the second row,..., I can put the eighth queen in any of eight slots in the eighth row. So, eight to the power of eight.
- 3) $8! = 40320$. I can put the first queen in any of eight slots in the first row. I can put the second queen in any of slots in the second row, except for a column that I already used for the first row, so that is seven choices. I can put the third queen in any of slots in the third row, except for a column that I already used for the first two rows, so that is six choices,..., I can put the eighth queen in any of slots in the eighth row, except for a column that I already used for the first seven rows, so that is one choice.
- 4) <other>

If we were doing generate and test, then clearly option '3' is how we would do it.

A)

① Total Arrangements:

$$8! = 40320 \text{ arrangements.}$$

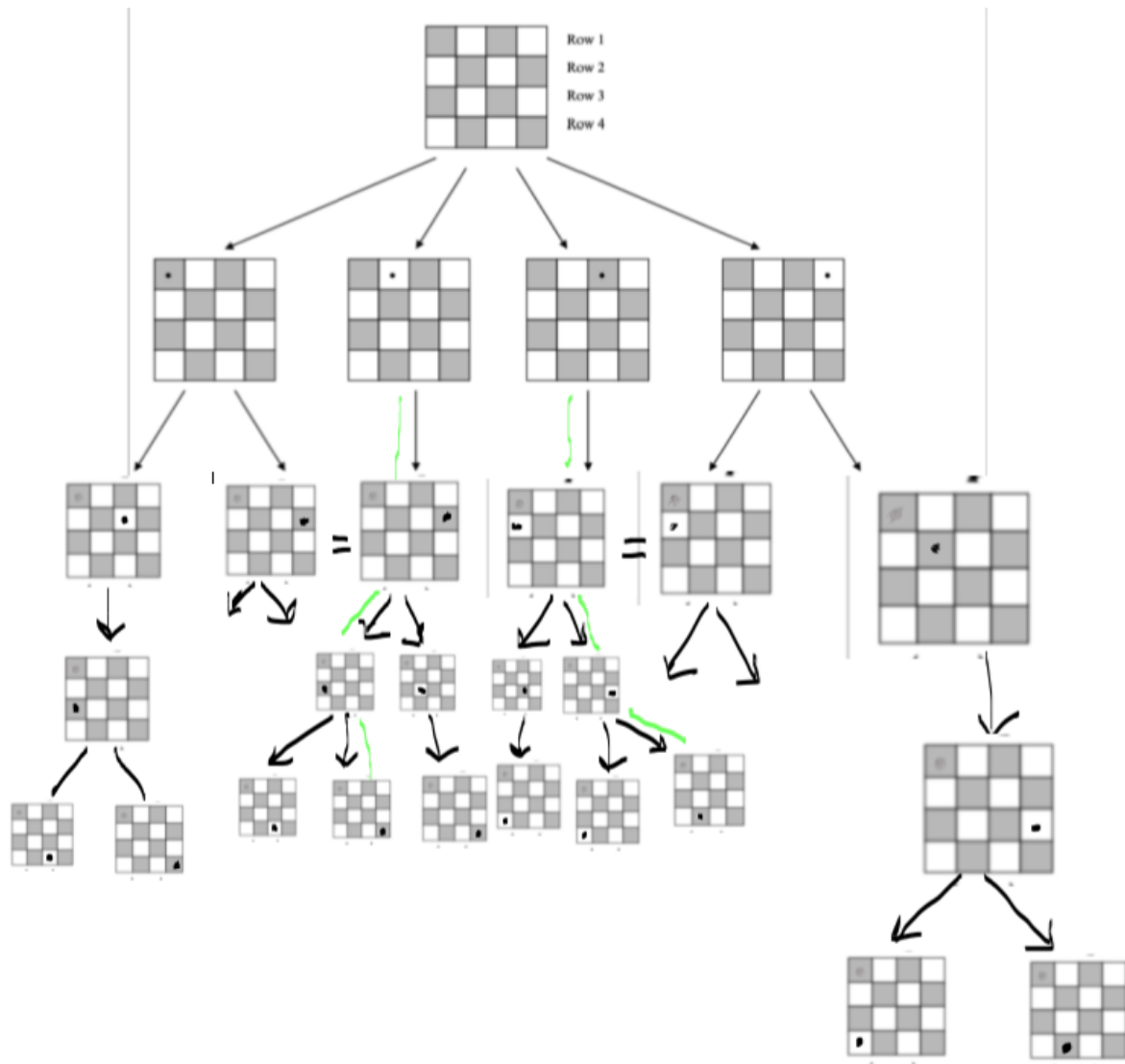
② Arrangements per second:

$$1000$$

$$\text{So, } \frac{40,320}{1,000} = 40.32 \text{ seconds for all the arrangements}$$

B) 40.32 seconds for all. since they are spread out in the search space, and one can be anywhere. we can just divide the total by 12. $\frac{40.32}{12} = 3.36$ seconds to at least get 1 solution!

c) Example would be the twin prime numbers. First we need to not be sure if solution exists in the first place. The Twin primes conjecture concerns pairs of prime numbers w/ a difference of 2. The numbers 5 and 7 are twin primes.
(5, 7)



two solutions

The N Queen is the problem of placing N chess queens on an $N \times N$ chessboard so that no two queens attack each other. For example, following are **two solutions** for 4 Queen problem.