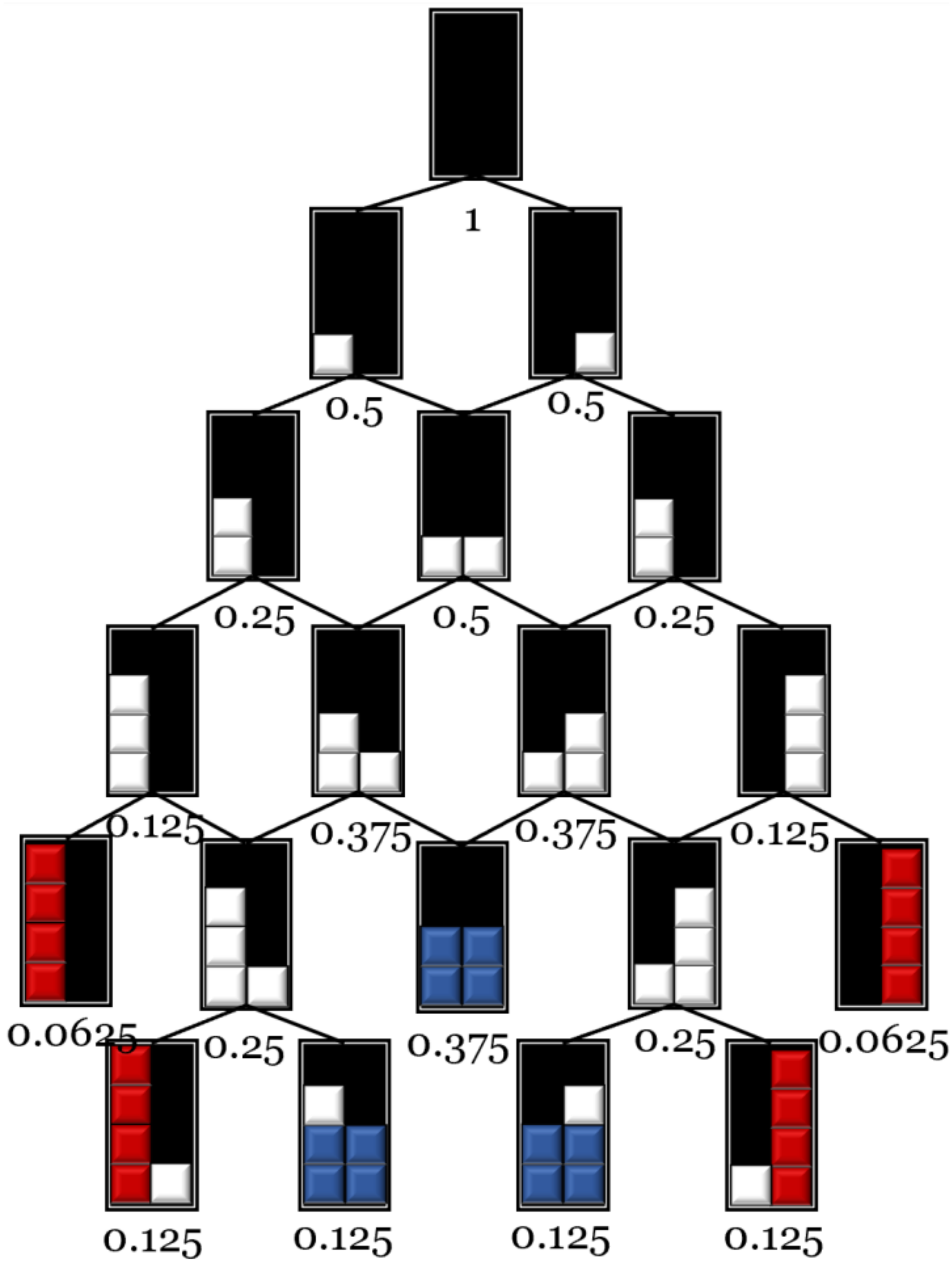
Project Description (taken from assignment file):

Tetris is a game in which blocks fall into a rectangular area (initially empty), and the player is rewarded for placing these blocks so that they complete one or more lines (where all of the blocks in a row are occupied). The game continues until the blocks reach or exceed the top of the play area, at which point the player loses. In a normal game of Tetris, the blocks fall in groups of 4 (called tetrads) and the player can move and rotate these tetrads until they reach the bottom of the play area or land on some other Tetris block.

In this project, we will evaluate a simplified random version of Tetris. In this version of Tetris, blocks will drop one at a time in random columns, and the game will continue until either the top of the play area is reached (a loss), or until a certain number of lines have been completed (a win). In the original version of Tetris, lines are removed from the playing field as they are completed, but our version of Tetris will continue until either the player has won (by completing a certain number of lines) or they have lost (by reaching the top of the play area).

For each problem instance, you will be given the height and width of the playing area (in blocks) and the number of lines required to win, and you will need to compute the probability of winning the game if blocks drop into an empty playing area randomly.

For example, if the game is played in 4 by 2 area (4 rows, 2 columns) and the player needs to make 2 lines to win, the player has a 62.5% chance to win:



In the diagram above, each possible configuration is labeled with the probability of reaching that position, and the winning and losing positions are highlighted with blue and red, respectively. The probability of winning is the probability to reach any the winning state (0.375 + 0.125 + 0.125 = 0.625, or 62.5%).

As another example, the probability of winning a game with r rows and 2 columns where we are only required to make 1 row is 1 − 0.5 r−1. This is because the only way to lose this game is for all of the blocks after the first to land in the same column as the first block—if any block chooses the other column, this completes a row, and the game is won.