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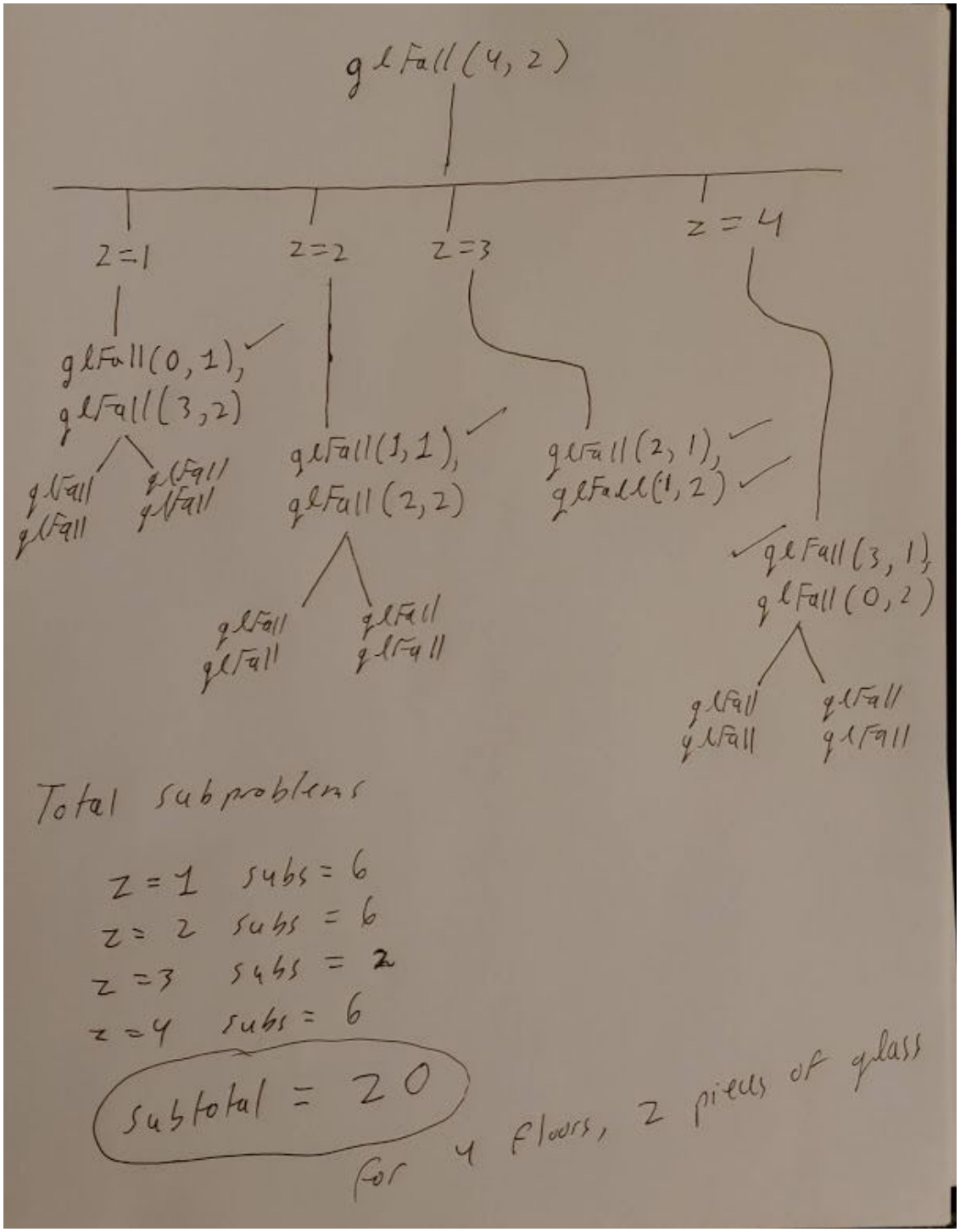
Glass Falling Problem Analysis



a) Optimal Substructure

We can make a few assumptions about this problem.

If a shard of glass breaks on a floor F then it breaks on all floors above F.

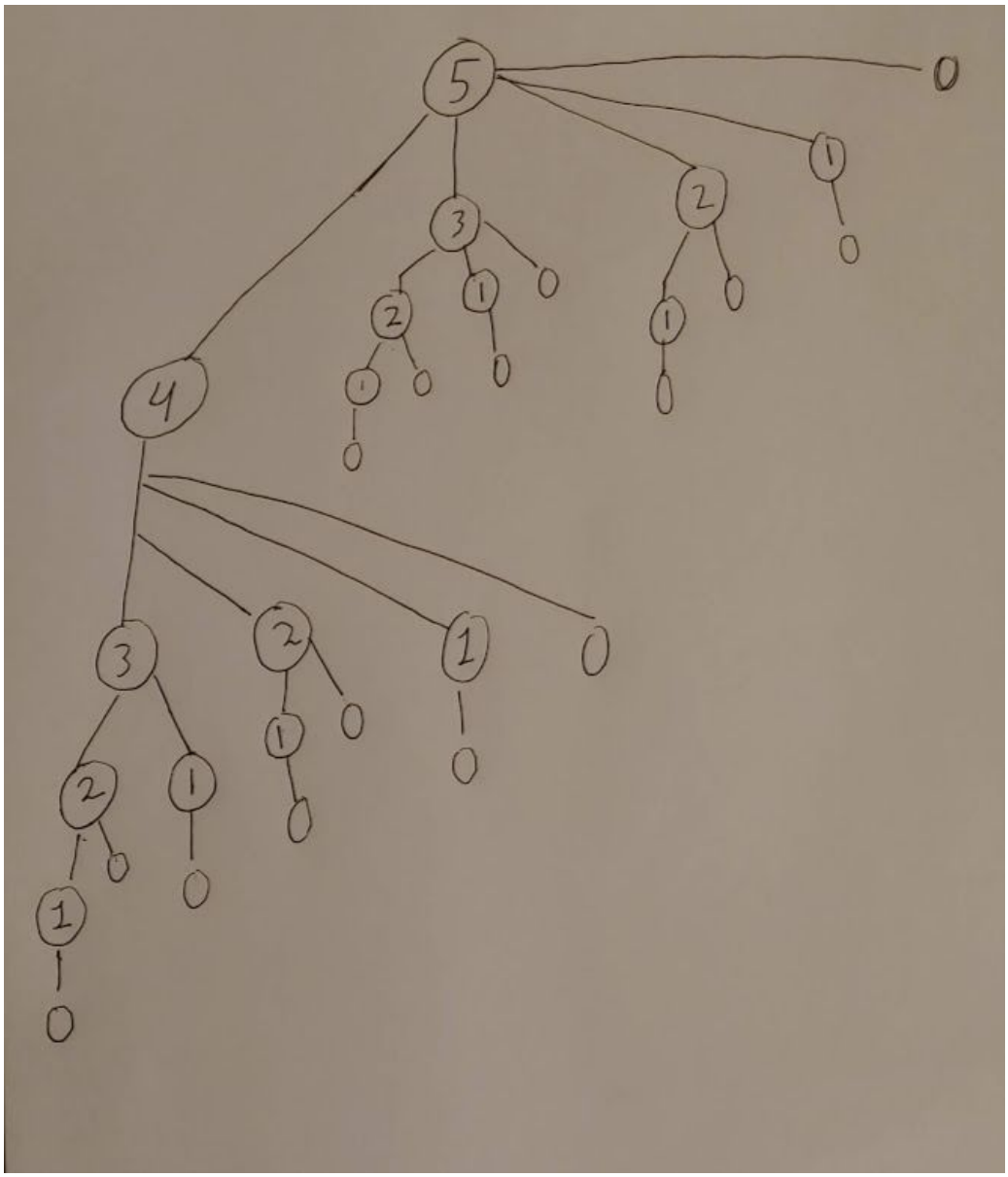
If it a shard of glass not break on floor F it will not break on any floors below F.

By these two assumptions the recursive base case is reached taking off z floors and one shard of glass on each recursive call until we run out of pieces of glass or we reach the first floor.

d) 20 subproblems need to be resolved (see attached recurrence tree)

Rod Cutting Analysis

a) Recurrence on n = 5



b) 15-2

A greedy counterexample:

Suppose we had a rod of length 6
And p1 = 2, p2 = 15, p3 = 34, p4 = 36

A greedy solution would take rod p3 as it is the most dense, and follow it with
rod p2 totaling to 36 + 15 = 51, however ideally it would have chosen
P3 twice which is 36 * 2 = 72, a solution which would only be arrived through a dynamic programming approach.