Assignment 4: Solutions and rubric

(1) The DP solution to this problem is given by the following recurrence relation.

$T(n) = \sum_{i=1}^{n} T(i)T(n-1-i)$
This number is also known as Catalan number.

Rubric: 5 for correct DP solution. -1 for DP solution but not correct pseudocode. -1/-2 for correct expression but no pseudocode/algorithm 2 for recursion with DP.

(2) `https://leetcode.com/articles/knight-probability-in-chessboard/.`

Rubric: Top down approach - 6 marks Bottom up approach - 6 marks Time complexity - 3 marks.

(3) We recurse on the maximum value subsequence ending at j: $M(j) = max(M(j-1) + a_j, a_j)$ if $j = 0, return\ a_j$.

In this case $a_0 = 0$.

This algorithm is also known as Kadane's algorithm. For detail refer to `https://en.wikipedia.org/wiki/Maximum_subarray_problem`.

Rubric: Missing/ wrong max subarray : 2 marks have been deducted. Any uninitialized variable : 0.5 marks have been deducted. -ve number array not handled : 1 mark has been deducted

(4) `https://www.geeksforgeeks.org/partition-a-set-into-two-subsets-such-that-the-difference-of-subset-sums-is-minimum/.`

Rubric: 10 marks for a DP-based approach (complexity being $O(n * sum)$ or $O(n^2 * m)$)

If used only recursion (without memoization i.e $O(2^n)$), 7 marks

1 mark cut for not initializing DP array / missing explanations etc