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day2 theory

The asymptotic space complexity for the IntGrid2D implementation is described by O(n^k), which is demonstrated below by changing the input. The number of memory cells that the algorithm needs defines the space complexity, so as the height and width of the grid increase or decrease, it changes the amount of memory required to store the grid.

Examples sizes of the grid:

grid[][]	
grid[1][1] —> 1x1 grid - 1 square	1^2
grid[2][2] —> 2x2 grid - 4 squares	2^2
grid[3][3] —> 3x3 grid - 9 squares	3^2
grid[4][4] —> 4x4 grid - 16 squares	4^2
grid[5][5] —> 5x5 grid - 25 squares	5^2
grid[n][n] —> nxn grid	n^2

This shows that the formula is n^2, which translates to O(n^k) in big-Oh notation and represents the growth rate of the grid in terms of memory space. The space complexity of the 2D grid is O(n^k), or polynomial, because the size is determined by the parameters in the IntGrid2D constructor. The upper bound is O(n^2) and therefor the lower bound Ω(h), which is linear.