

Math 2001 - Writing project 3

First draft due November 12, final draft November 19, 2025

The following **writing project** will be graded on clarity and correctness and should be typed in LaTeX.

Problem. You want to split a stack of n boxes ($n \in \mathbb{N}$), one box on top of the other, into n stacks of height 1.

- In each move, you can split a single stack, say of height n , into 2 stacks, say of heights a and b ($a, b \in \mathbb{N}$) with $a + b = n$. This move has score ab .
- Then you can split one of the new stacks into two of smaller heights, say u, v , and add uv to your previous score.
- Repeat splitting single stacks and adding the product of heights of the new stacks to the previous score until you have n stacks of height 1.

What is the maximum score possible starting with a stack of height n ?

Your write up should include the following:

- (1) A section describing the problem.
- (2) A theorem stating the main result.
- (3) A proof of the theorem.
- (4) Give precise arguments for all your statements.