

Unit 1 - Combinatorics - Basic Methods

Week 3 - Generating Functions

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1

Catalan Addendum Problem a^4 :

Prove the number of left factors of dyck paths with $(n - 1)$ up steps is the catalan number C_n .

2

Catalan Addendum Problem e^5 :

Show that the number of Non-Nesting matchings, ways of connecting pairs of points on the x-axis using arcs above the axis, where no arc is completely contained inside another, is the catalan numbers C_n .

3

Consider the set of paths, M_n which are always positive height and include steps of the form $(1, 1), (1, 0), (1, -1)$ connecting $(0, 0)$ and $(n, 0)$. Form a recursion, and use it to compute M_0 through M_6 .