Maths for Computer Science
Computing the sum of cubes

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The problem

Definition:
Sum of the n first cubes:
$C_n = \sum_{k=1}^{n} k^3$

- Determine the asymptotic behavior of the summation
- Compute on the first ranks and prove the –expected– result by induction on n
- Apply the undetermined coefficient method
- alternative method: solve a simplified problem presented in the next slide.

A simplified problem

Preliminary: compute the sum of the first n odd numbers.

Proposition:

Solve the following result for all n,

$$\Delta_n^2 = \sum_{k=1}^{\Delta_n} (2k-1) = \sum_{k=1}^{n} k^3 \qquad (1)$$

The objective is to provide an inductive geometrical proof of this result.