



# Substitution method

*The most general method:*

- 1. *Guess*** the form of the solution.
- 2. *Verify*** by induction.
- 3. *Solve*** for constants.

**EXAMPLE:**  $T(n) = 4T(n/2) + n$

- [Assume that  $T(1) = \Theta(1)$ .]
- Guess  $O(n^3)$ . (Prove  $O$  and  $\Omega$  separately.)
- Assume that  $T(k) \leq ck^3$  for  $k < n$ .
- Prove  $T(n) \leq cn^3$  by induction.