

Homework 1

1. Let $g(n) = 1 + c + \dots + c^n$ for $c \in \mathbb{R}$, $c > 0$:

- a. $g(n) = \Theta(1)$ for $c < 1$
- b. $g(n) = \Theta(n)$ for $c = 1$
- c. $g(n) = \Theta(c^n)$ for $c > 1$

2. Solve recurrent equations:

- a. $a_{n+2} = 5a_{n+1} - 6a_n$, $a_1 = 2$, $a_2 = 1$
- b. $a_n = 4a_{n-1} - 4a_{n-2}$, $a_1 = 2$, $a_2 = 1$
- c. $a_n = 4a_{n-2}$, $a_1 = a_2 = 1$

Remember: for root multiplicity 2: $a_n = C_1 t^{n-1} + C_2 n t^{n-1}$.

3. Who is faster: $\sum_{i=1}^n i^k$ or n^{k+1} .