

Homework 1, Due Tuesday September 11, 72 points total

1. (12 points each) Prove that the following statements are true:

(a) $4n^3 - 6n = \Theta(n^3)$

(b) $n! = O(n^n)$

(c) $n^{1.2} + n \lg n = \Theta(n^{1.2})$

2. (12 points each) Show that the following statements are false:

(a) $3n^2 - 9n = O(n)$

(b) $n^2 \lg n = \Theta(n^2)$

3. (12 points) Prove by induction that for $x \neq 1$ and $n \geq 0$ that

$$\sum_{i=0}^n x^i = \frac{x^{n+1} - 1}{x - 1}.$$