

Homework 1, Due Thursday February 7, 60 points total

1. (10 points each) Prove that the following statements are **true**:

(a) $4n - 6\sqrt{n} = \Theta(n)$

(b) $7^n = O(n!)$

(c) $n^{1.3} + n \log^2 n = \Theta(n^{1.3})$

2. (10 points each) Show that the following statements are **false**:

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

(b) $n^2 \lg n = \Omega(n^3)$

3. (10 points) Prove by induction that for $x \neq 1$ and $n \geq 0$ that

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