

$$\frac{1}{3}(n+1)(n-2) - 5 = \Theta(n^2)$$

$$C_1 n^2 \leq \frac{1}{3}(n^2 - n - 2) - 5 \leq C_2 n^2$$

$$C_1 n^2 \leq \left(\frac{1}{3}n^2 + \frac{1}{3}n - \frac{2}{3} - 5 \right) \leq n^2 \quad C_2 = 1$$

$$\frac{1}{3}n^2 - \frac{1}{3}n - \frac{17}{2} \leq n^2$$

$$\frac{1}{2}$$

$$\frac{1}{3}n \leq \frac{1}{4} \left(\frac{1}{3}n^2 \right)$$

$$4 \leq n$$

$$11 \leq n$$

$$n_0 = 11$$

$$\frac{17}{2} \leq \frac{1}{4} \left(\frac{1}{3}n^2 \right)$$

$$6 \times 17 \leq n^2$$

$$\sqrt{6 \times 17} \leq n \Leftrightarrow 11 \leq n$$

$$\frac{1}{3}n^2 - \frac{1}{3}n - \frac{17}{2} \geq \frac{1}{3}n^2 - \frac{1}{4} \left(\frac{1}{3}n^2 \right) = \frac{1}{4} \left(\frac{1}{3}n^2 \right)$$

$$n^2 \left(\frac{1}{4} - \frac{1}{12} - \frac{1}{2} \right)$$

$$\left(\frac{1}{6} \right) n^2 \quad C_1 = \frac{1}{6} \quad n \geq 11$$

$$\lg n! = \Omega(n \lg n)$$

$$n! = n \cdot \sum$$

$$C n \lg n \leq \lg n!$$

$$\sum_{i=\frac{n}{2}+1}^n \lg(i) + \sum_{i=1}^{\frac{n}{2}} \lg(i)$$

$$n \leq n!$$

$$\lg n \leq \lg(n!)$$

$$C \frac{n}{2} \lg n \geq \sum_{i=\frac{n}{2}+1}^n \lg(i) ?$$

