

ANALISI 1 - C.d.L. in FISICA A.A.2005/06

Induzione

Esercizio 1. Dimostrare le seguenti uguaglianze (o disuguaglianze) per induzione.

$$\sum_{k=0}^n \binom{n}{k} = 2^n \quad (9\text{nov. } 2004)$$

$$\sum_{k=0}^n k \binom{n}{k} = n2^{n-1} \quad (9\text{nov. } 2004)$$

$$\sum_{k=1}^n \frac{k}{2^k} = 2 - \frac{(n+2)}{2^n} \quad (9\text{nov. } 2000)$$

$$\sum_{k=1}^n (-1)^{k+1} k^2 = (-1)^{n+1} \sum_{k=1}^n k \quad (9\text{nov. } 2000)$$

$$2^n + 4^n < 5^n \quad \forall n \in \mathbb{N} \setminus \{1\}$$

$$\sum_{k=1}^n 2^k = 2^{n+1} - 2$$

$$\sum_{k=1}^n k(k+1) = \frac{n(n+1)(n+2)}{3}$$

$$\sum_{k=1}^n \frac{1}{(2k-1)(2k+1)} = \frac{n}{2n+1}$$

$$\sum_{k=1}^n \frac{1}{(3k-2)(3k+1)} = \frac{n}{3n+1}.$$