Problem #10

May 20, 2012

Difficulty: easy
Prerequisite: series (Calculus II)

Prove that, for all $x, y \in \mathbb{R}$

$$\sum_{j=0}^{\infty} \frac{x^j}{j!} \sum_{k=0}^{\infty} \frac{y^k}{k!} = \sum_{n=0}^{\infty} \frac{(x+y)^n}{n!}.$$

Try to give two different proofs.