

MTH 445 Real Analysis

Problem: Prove using mathematical induction:

$$\text{For all natural numbers } n, 1 + 2 \cdot 2 + 3 \cdot 2^2 + \dots + n \cdot 2^n = (n-1)2^n + 1$$

Brainstorming:

P(0): _____

P(k): _____

P(k+1): _____

We can P(k+1) from P(k) by adding the k+1'st term _____ to each side of the equality for P(k), then simplifying the right hand side of this equality.

Proof:

Let P(n) denote the proposition that

1. Basis Step: P(0) is true, since

2. Inductive Step: