

Worksheet 4

1. Prove for $n \geq 0$:

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

2. Prove for $n \geq 1$: $1 \cdot 1! + 2 \cdot 2! + \cdots + n \cdot n! = (n + 1)! - 1$

3. Prove that 2 divides $n^2 + n$ whenever n is a positive integer