

1. Prove that $\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$ for all positive integers n .
2. Prove that $\sum_{i=1}^n i^3 = \left(\frac{n(n+1)}{2}\right)^2$ for all positive integers n .
3. Prove that $\sum_{i=1}^{n+1} i \cdot 2^i = n \cdot 2^{n+2} + 2$ for all positive integers n .
4. Prove that $\sum_{i=1}^n i \cdot i! = (n+1)! - 1$ for all positive integers n .
5. Prove that any amount of postage that is at least 12¢ can be obtained using 3¢ and 7¢ stamps.