2.6 Mathematical Induction

Use mathematical induction to prove the following statements.

1. $1 + 2 + 3 + 4 + \ldots + n = \dfrac{n(n+1)}{2}$

2. $2 + 4 + 6 + \ldots + 2n = n(n+1)$

3. $3 + 7 + 11 + \ldots + (4n-1) = n(2n+1)$

4. $2 + 7 + 12 + \ldots + (5n-3) = \dfrac{n(5n-1)}{2}$

5. $1^2 + 2^2 + 3^2 + 4^2 + \ldots + n^2 = \dfrac{n(n+1)(2n+1)}{6}$

6. $S_n: \quad 1^3 + 2^3 + 3^3 + 4^3 + \ldots + n^3 = \left[\dfrac{n(n+1)}{2}\right]^2$