

## 8A Introduction to Proof by Induction

1. Prove by mathematical induction that, for  $n \in \mathbb{Z}^+$

$$\sum_{r=1}^n (2r - 1) = n^2$$

2. Prove, by mathematical induction, that for  $n \in \mathbb{Z}^+$ ,

$$\sum_{r=1}^n (r^2) = \frac{1}{6}n(n+1)(2n+1)$$

3. Prove, by mathematical induction, that for  $n \in \mathbb{Z}^+$ ,

$$\sum_{r=1}^n (r2^r) = 2[1 + (n-1)2^n]$$