

SEQUENCES & SERIES (Q 4 & 5, PAPER 1)

LESSON NO. 7: PROOFS BY INDUCTION

2005

5 (b) Prove by induction that $\sum_{r=1}^n (3r - 2) = \frac{n}{2}(3n - 1)$.

2002

5 (c) Prove by induction that, for any positive integer n , $x + x^2 + x^3 + \dots + x^n = \frac{x(x^n - 1)}{x - 1}$,
where $x \neq 1$.

2003

5 (b) Use induction to prove that 8 is a factor of $7^{2n+1} + 1$ for any positive integer n .

2004

5 (c) Prove by induction that $2^n \geq n^2$, $n \in \mathbf{N}$, $n \geq 4$.

2001

5 (c) Use induction to prove that, for n a positive integer, $(\cos \theta + i \sin \theta)^n = \cos n\theta + i \sin n\theta$
for all $\theta \in \mathbf{R}$ and $i^2 = -1$.