Mathematical Induction 2

1. Prove by Mathematical induction,

   $P(n)$: $\frac{1}{2n} \leq \frac{1.3.5...(2n-1)}{2.4.6...(2n)}$ wheren $\in$**N**.

2. Prove by mathematical induction:

   $1^2 + 2^2 + 3^2 + \cdots + (2n)^2 = \frac{[n\ (2n+1)(4n+1)]}{3}$ for the first $2n$ positive integers.

3. Prove by mathematical induction: $6|(n^3 - n)$ for all natural values of n.

4. Prove that $(9^n - 8n - 1)$ is divisible by 8 for all non-negative integers, n .