

Computer Science and Engineering Department, SVNIT, Surat.
Automata and Formal Languages
(Mathematical Induction)

TUTORIAL - 2

Prove the following by mathematical induction.

1. Let $S(n) = 1 + 2 + 3 + \cdots + n, n \in \mathbb{N}$.
Prove by mathematical induction the statement
 $P(n): S(n) = \frac{n(n+1)}{2}$, for all integers $n \geq 1$
2. Let $S(n) = 1 + 3 + 5 + \cdots + (2n - 1)$.
Prove by mathematical induction the statement
 $P(n): S(n) = n^2$, for all integers $n \geq 1$
3. Prove by mathematical induction, that
 $(n + 1)^2 + (n + 2)^2 + (n + 3)^2 + \cdots + (2n)^2 = \frac{n(2n+1)(7n+1)}{6}$ is true for all natural number n .
4. Prove by mathematical induction, that
 $1 \cdot n + 2(n - 1) + 3(n - 2) + \cdots + (n - 1) \cdot 2 + n \cdot 1 = \frac{1}{6}n(n + 1)(n + 2)$ is true for all the natural numbers n .
5. Prove by mathematical induction, that $n(n + 1)(n + 2)(n + 3)$ is divisible by 24 for all natural numbers n .