

Tutorial 2 - Mathematical induction

6th & 11th January 2017

1. State and prove the *diseased monks* problem using induction.
2. Show that $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$.
3. Show that 3 divides $n^3 - n$.
4. Show that 4 divides $5^n - 1$.
5. Show that a connected graph without any cycle satisfies:
number of nodes = number of edges + 1.
6. prove the Euler's polyhedron formula: $V - E + R = 2$.
7. State and prove Demorgan's law with n sets.
8. Prove Mathematical Induction.
9. Show that any $n \geq 14$ can be expressed as the sums of 3s and 8s only.
10. What is the konigsberg bridge problem?
11. State the generalized version of the konigsberg bridge problem and prove it.