Homework 9

Mathematical foundations of informatics (I201, 2008)

Instructor: Tang

(This HW will be collected on 12/10 Wed. in the class. Write LEGIBLY and explain your answers clearly. The homework you hand in must be your own work, IN YOUR OWN WORDS and your own explanation. **NO late homework will be accepted.**)

1. (50pts) Use mathematical induction to prove the following theorems, for all n $\in Z^+$.
   a. 2 +4+6+…+2n = n(n+1)
   b. 3 | (n^3+2n)
   c. $\frac{1}{1\cdot 3}+\frac{1}{3\cdot 5}+\frac{1}{5\cdot 7}\ldots+\frac{1}{(2n-1)(2n+1)}=\frac{n}{2n+1}$
   d. $1^2+3^2+5^2+\cdots+(2n-1)^2=\frac{n(2n-1)(2n+1)}{3}$
   e. $1+2+3+\cdots+n<\frac{(2n+1)^2}{8}$