Homework due on Wednesday, February 9

Read carefully sections 2.3 and 7.1 in the book. Solve the following problems. It is very important that your solutions are written carefully, using full sentences.

Problem 1. We define 4^n for every $n \in \mathbb{N}$ as follows: $4^1 = 4$ and if 4^n is defined for some n then $4^{n+1} = 4 \cdot 4^n$. Prove that $3|(4^n + 2)$ for every $n \in \mathbb{N}$. Use induction. Explain in details each step of your reasoning.

Problem 2. We define integers x_n for every $n \in \mathbb{N}$ as follows: $x_1 = 1$ and if x_n is defined then $x_{n+1} = x_n + 2n + 1$. Prove that $x_n = n^2$ for every $n \in \mathbb{N}$. Use induction. Explain in details each step of your reasoning.