Math 2001: Homework P4

Due: September 23, 2009

1. From the book do problems:

   (a) 2.2.2 (a–e), 2.2.4, 2.2.6, 2.2.11.

2. Consider the following

   Claim. *The number $n(n+1)$ is an odd number for every n.*

   Proof. Assume the statement is true for n. We prove the statement for $n+1$ by induction. Note that
   $$(n+1)((n+1)+1) = n(n+1) + 2(n+1).$$

   By induction $n(n+1)$ is odd. Thus, $(n+1)((n+1)+1)$ is the sum of an odd number $n(n+1)$ and an even number $2(n+1)$. The sum of an odd number and an even number is odd. Thus, we have proved the claim by induction. □

   I checked the claim and it doesn't seem to work for $n = 15$, since $15 \cdot 16 = 240$, which is even. What is wrong with the proof?