CMSC 250 (0201 & 0202) Fall 2004 — Homework #5

Due Wednesday, Oct. 5 at the beginning of your discussion section.

You must write the solutions to the problems single-sided on your own lined paper, with all sheets stapled together, and with all answers written in sequential order or you will lose points.

Each of the following statements is either true or false. You must clearly state which you believe it to be followed by your justification. If it is something that you are proving for all elements in a domain, it must be a formal proof. If it is something you are proving for an element of the domain it must be a specific example with enough algebra/justification to show that they are truly counterexamples.
Your proofs must be complete as discussed in class -including things like a sequence of statements that are known to be true and the reason you know that the statement you wrote is true.

1. $\forall n \in Z, n + n^2 + n^3 \in Z^{even} \rightarrow n \in Z^{even}$
2. There is an integer n such that $2n^2 - 5n + 2$ is prime.
3. For all positive integers a, b, q, p, if $a \equiv_q b$ and $p|q$, then $a \equiv_p b$.
4. For all integers n, if n is prime then $(-1)^n = -1$.
5. For all integers $n \geq 1$, $n(n+1)(n+2)(n+3)$ is one less than a perfect square.
6. There is an odd integer (n) such that $4|n(6n + 16)$
7. For all integers (a, b and c), if $a|b$ and $a|c$, then $a|(b - c)$.