Name:

Math/CS 231 Practice Proofs due 11/9/09

1. Prove that if m is an even integer, $m+7$ is odd. Do this proof in two ways (out of three): direct proof, indirect proof, or proof by contradiction.

Proof Method 1 (circle one): Direct proof Indirect Proof Proof by contradiction

Proof Method 2 (circle one): Direct proof Indirect Proof Proof by contradiction

2. Using induction, prove that for all integers $n \geq 1$, $2^{2n} - 1$ is divisible by 3; that is, $3 \mid 2^{2n} - 1$.

3. Given sets A, B, and C in the same universe, determine if each of the following statements is true or false. If it is true, then prove it. If it is false, then give a counterexample.

   (a) $C \subseteq A$ and $C \subseteq B \rightarrow C \subseteq A \cup B$

   (b) $C \subseteq A \cup B \rightarrow C \subseteq A$ and $C \subseteq B$