Problem Set 2 Foundations Due 2/1/2005

Each problem is worth 5 points. Clear and complete justification is required for full credit. You are welcome to discuss these problems with anyone and everyone, but must write up your own final submission without reference to any sources other than the textbook and instructor.

1. Do exercise 1.12.1.

2. Prove that for any integer n, $n^2 + n + 1$ is odd.

Use the following definitions for problems 3 and 4: An integer a is said to be **congruent to 1 modulo 3** if and only if there exists an integer n such that $a = 3n + 1$. An integer a is said to be **congruent to 2 modulo 3** if an only if there exists an integer n such that $a = 3n + 2$.

3. Prove that if a is congruent to 2 modulo 3 and b is congruent to 2 modulo 3, then $a + b$ is congruent to 1 modulo 3.

4. Prove that if a is congruent to 1 modulo 3 and b is congruent to 1 modulo 3, then $a \cdot b$ is congruent to 2 modulo 3.

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