**Nipissing University Senior Mathematics Competition**

Problem Set 2 – Proof By Contradiction – May 7, 2010

Prove all of the following using a contradiction. Be sure to clearly state what your assumption is, and why you have arrived at a contradiction.

1. There is no greatest integer.
2. For all integers , if is odd then is odd.
3. There are no real solutions to the equation .
4. A triangle cannot have two right angles.
5. If is a rational number and is an irrational number, then is an irrational number.
6. The fourth root of 2 is irrational.
7. If and are the (nonzero) side lengths of a triangle and and satisfy the relation , then the triangle is a right triangle. (Assume the Pythagorean Theorem has already been proved.)