Name (Last, First): _____ Student ID: _____

Quiz 4 "Choose an Effective Notation", February 3, 2015. You have 30 minutes to solve as much as you can of the following problems. Please write on both sides of the page. **Good Luck!**

Problem 1 (Larson's 1.5.1). A couple days ago in the morning it started snowing at a heavy and constant rate. A snowplow started out at 8:00AM. At 9:00AM, it had gone 2km. By 10:00AM, it had gone 3km. Assuming that the snowplow removes a constant volume of snow per hour, determine the time at which it started snowing.

Problem 2 (Larson's 1.5.10). A well known theorem asserts that a prime $p > 2$ can be written as a sum of two perfect squares ($p = m^2 + n^2$ with m and n integers) iff p is 1 mod 4. Assuming this, prove:

1. Every prime which is 1 mod 8 can be written as $x^2 + 16y^2$, with x and y integers.
2. Every prime which is 5 mod 8 can be written as $(2x + y)^2 + 4y^2$, with x and y integers.

Problem 3 (no credit, yet the best solutions will be advertised). What is your favourite "Modify the Problem" or "Choose an Effective Notation" problem?