Starting test

June 19, 2017

1. Prove that if m + n and n + p are even integers, where m, n, and p are integers, then m + p is even.

2. Show that every odd integer is the difference of two squares.

3. Use a proof by cases to show that $\min(a, \min(b, c)) = \min(\min(a, b), c)$ whenever a, b, and c are real numbers.

4. The Logic Problem, taken from WFF?N PROOF, The Game of Logic, has these two assumptions:

   1. Logic is difficult or not many students like logic.

   2. If mathematics is easy, then logic is not difficult.

   By translating these assumptions into statements involving propositional variables and logical connectives, determine whether each of the following are valid conclusions of these assumptions:

   a) That mathematics is not easy, if many students like logic.

   b) That not many students like logic, if mathematics is not easy.

   c) That mathematics is not easy or logic is difficult.

   d) That logic is not difficult or mathematics is not easy.

   e) That if not many students like logic, then either mathematics is not easy or logic is not difficult.