ACMS Problem Solving Seminar - Fall 2005
Presentation Material 5 - Extremal Principle

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Note: The following problems are taken from various sources, which are listed in pdf form on the ACMS problem solving seminar webpage.

1. In Mathsland, there are 100 farms and 100 lakes. Prove that we can dig channels, each farm getting exactly one lake, so that none of the channels intersect.

2. In a rectangle of size 20×25, there are 120 arbitrarily placed squares with unit edge length. Prove there is room for one circle of unit diameter as well.

3. Show that there is no solution to

$$x^2 + y^2 = 3(u^2 + v^2)$$

   in the positive integers.

4. Show that $\sqrt{2}$ is irrational.