**640:300 WORKSHOP 5**
**EQUATIONS WITH INTEGER SOLUTIONS**

The following problems concern certain *Diophantine equations*. These are equations for which we seek only integer solutions.

*(i) Prove that there are no integers* $x$ *and* $y$ *such that:* $x > 0$ and $y > 0$

$$x^2 - y^2 = 2.$$

*(ii) Let* $x, y, z \in \mathbb{Z}$*. Prove that if* $xyz = 1$*, then the only solutions for* $(x, y, z)$ *are:*

$$(1,1,1),\ (-1,\ -1,\ 1),\ (1,\ -1,\ -1),\ (-1,\ 1,\ -1).$$

*Hint.* This is a Diophantine equation involving 3 variables. Modify it so that you would deal with two (possibly new) variables.