Math 290 **Fall 2006** **Project 01**

Due September ? (We need to discuss this)

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Name

Be sure to re-read the WRITING GUIDELINES rubric, since it defines how your project will be graded. In particular, you may discuss this project with others but **you may not collaborate on the written exposition of the solution.**
"*It is by logic that we prove but by intuition that we discover.*" (Henri Poincaré)

Two Theorems to Prove

Part 1. There is exactly one real number that can be written in the position marked by $\Box$ in Theorem (1) below that makes the statement true. Determine that number and prove the resulting theorem.

Theorem 1 (1) *Given any two solutions* $(\beta_1, \beta_2, \cdots, \beta_n)$ *and* $(\gamma_1, \gamma_2, \cdots, \gamma_n)$ *of the linear equation* $a_1x_1 + a_2x_2 + \cdots + a_nx_n = b$.*If* $(\beta_1 + \gamma_1, \beta_2 + \gamma_2, \cdots, \beta_n + \gamma_n)$ *is also a solution. Then* $b = \Box$.

Part 2. Prove the following theorem.

Theorem 2 (2) *Given two solutions* $(\beta_1, \beta_2, \cdots, \beta_n)$ *and* $(\gamma_1, \gamma_2, \cdots, \gamma_n)$ *of the linear equation* $a_1x_1 + a_2x_2 + \cdots + a_nx_n = b$.*Then* $(\beta_1 - \gamma_1, \beta_2 - \gamma_2, \cdots, \beta_n - \gamma_n)$ *is a solution of the related linear equation* $a_1x_1 + a_2x_2 + \cdots + a_nx_n = 0$.