MATH 108—HOMEWORK 04

NAME _____

| **Directions: please print this page, and put your solutions in the space provided.** |

1. Prove or disprove: if x and y are irrational numbers, then xy is also irrational.

2. Prove or disprove: if a, b, and c are positive integers and a divides both $(b-c)$ and $(c-d)$, then a divides $(b-d)$.

3. Prove or disprove: if $a, b, c \in \mathbb{Z}$, then at least one of $(a - b)$, $(b - c)$, or $(c - a)$ is even.

4. Let $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$. In other words, I is the 2×2 identity matrix.

Prove or disprove: if A is a 2×2 matrix with entries from $\mathbb{R}$ and $A^2 = I$, then $A = I$ or $A = -I$.