Introduction to Mathematical Reason	Test #2 MATH 300	March 11, 2008
Name: _____	R. Hammack	Score: _____

Directions: Please answer the questions in the space provided.

1. Suppose $a, b, c, d \in \mathbb{Z}$ and $n \in \mathbb{N}$. Prove that if $a \equiv b \pmod{n}$ and $c \equiv d \pmod{n}$, then $ac \equiv bd \pmod{n}$.
(Suggestion: Try direct proof.)

2. Suppose $a, b \in \mathbb{Z}$. If $a^2(b^2 - 2b)$ is odd, then both a and b are odd.
(Suggestion: Try contrapositive proof.)

3. Prove: If $a, b \in \mathbb{Z}$, then $a^2 - 4b - 2 \neq 0$.
   (Suggestion: Contradiction may be easiest.)

4. Suppose $a, b, c \in \mathbb{Z}$, and $a \neq 0$. Prove the following statement: If $a \nmid bc$, then $a \nmid b$ and $a \nmid c$.