Name: _____

Directions: Show all work. No credit for answers without work.

1. **[3 points]** Give the addition and multiplication tables for $\mathbb{Z}_5$.

2. **[2 parts, 2 points each]** Compute the following. Your answer should be an integer in the set $\{0, 1, \ldots, m-1\}$, where m is the modulus in the given problem.

   (a) $297 + 561 \pmod{48}$

   (b) $136 \cdot (-524) \pmod{87}$

3. Let $a, b, c, m \in \mathbb{Z}$ with $m \geq 1$. X

   (a) **[1 point]** According to the definition, what does $a \equiv b \pmod{m}$ mean?

   (b) **[2 points]** Prove that if $a \equiv b \pmod{m}$ and $b \equiv c \pmod{m}$, then $a \equiv c \pmod{m}$.