

Name:

**Problem 1:** *Does*

$$x^2 \equiv 33 \pmod{64}$$

*have a solution?*

**Solution:** Since  $64 = 2^6$ , we apply Theorem 9.12. Because 6 is greater than or equal to 3, this equation has a solution if and only if  $33 \equiv 1 \pmod{8}$ . This is the case, so this equation has a solution. In fact it has four solutions:  $x \equiv 15, 17, 47, 49 \pmod{64}$ .