

Math 420 Section 2
Midterm Exam

1. Solve the system of congruences

$$x \equiv 5 \pmod{739} \qquad x \equiv 6 \pmod{248}$$

2. Write out the multiplication table for \mathbb{Z}_{16}^\times .

3. a) State the definition of equivalence relation.

b) For two integers a and b , say $a \sim b$ if $5|(a^2 - b^2)$. Is this an equivalence relation?

4. State the definition of even permutation and list all the even permutations of S_4 .

5. Suppose a, q, b and r are integers and that $a = qb + r$. Suppose further that d is an integer and $d|b$.

Prove that $d|a$ if and only if $d|r$.