

MAS 4203 — QUIZ 2 — Summer 2014

~~Tuesday, July 15~~

MAKE-UP

NAME:

Instructions: All work should be written in a proper and coherent manner, and in a way that any student in the class can follow your work. Show all necessary working and reasoning. When giving proofs your reasoning should be clear. Only scientific or basic calculators are allowed.

TOTAL:

[1.] [2 + 3 = 5 pts]

- (a) Use the Euclidean Algorithm to compute $(441, 1155)$
- (b) Hence find integers x & y such that

$$441x + 1155y = (441, 1155).$$

(2)

2. [1 + 2 + 2 = 5 pts]

(a) Complete the Definition: Let $m > 0$, $m \in \mathbb{Z}$. Let $a, b \in \mathbb{Z}$. We say a is congruent to b modulo m and write _____ if _____.

(b) PROVE: If $a, b, c, d \in \mathbb{Z}$ and $a \equiv b \pmod{m}$ and $c \equiv d \pmod{m}$ then $a+c \equiv b+d \pmod{m}$.

(c) PROVE that $125^{101} + 260^{100}$ is divisible by 7.

3. [1 + 2 + 2 = 5 pts]

(a) Let $a, b \in \mathbb{Z}$ with $a > 0$ and $b > 0$.

PROVE or DISPROVE:

(i) If $a^2 \mid b^3$ then $a \mid b$.

(ii) If p is prime and $p^4 \mid a^3$ then $p^2 \mid a$.

(iii) Either $a^2 \equiv 0 \pmod{4}$ or $a^2 \equiv 1 \pmod{4}$

4. [BONUS] [1+1+1=3 bonus pts]



(a) Who is this guy?

(b) State his famous theorem about primes

(c) Complete the quote from ORE's biography:

"He was an _____ teacher, always expressing himself with great _____. His manner was _____; in his later life he was _____ and at times _____"