

Math 347 C1, D1, Spring 2008. Some practice problems from Chapters 6, 7 for midterm 2.

- (1) The exam is on Friday, March 28 in class. It covers chapters 5, 6, and 7.
- (2) Good additional review questions from the book in chapter 6 are: 2, 4, 5, 7, 8, 9, 18, 25
- (3) Good questions to study from chapter 7 are: 1-9, 17, 18, 19, 20, 21, 30.
- (4) Below are some other review questions.
 - (1) Find $\gcd(7700, 2233)$ and find x and y such that $\gcd(7700, 2233) = 7700x + 2233y$.
 - (2) Find all solutions to the equations:
a) $40x + 63y = 521$. b) $12x + 50y = 37$.
 - (3) If a is an integer, prove that $\gcd(14a + 3, 21a + 4) = 1$.
 - (4) Let n be an integer. Determine all positive integers m such that $m \mid (35n + 26)$ and $m \mid (7n + 3)$.
 - (5) Suppose that $n > 3$ and that n and $n + 2$ are both prime numbers. Prove that $n \equiv 5 \pmod{6}$.
 - (6) Prove that if n is odd then $n^2 \equiv 1 \pmod{8}$.
 - (7) Suppose that $\gcd(c, n) = 1$ and $ac \equiv bc \pmod{n}$. Prove that $a \equiv b \pmod{n}$.
 - (8) Suppose that $ac \equiv bc \pmod{mc}$ and $c > 0$. Prove that $a \equiv b \pmod{m}$.
 - (9) Compute the least residue of $10^{5156} \pmod{7}$
 - (10) Find all integer solutions of $17x - 11y = 272$.
 - (11) Prove that $n^{12} - a^{12}$ is divisible by 13 if a and n are coprime to 13.
 - (12) Prove that $n^{12} - a^{12}$ is divisible by 91 if a and n are coprime to 91.
 - (13) Prove that $n^{13} - n$ is divisible by 2, 3, 5, 7, and 13 for every integer n .
 - (14) Prove that any fourth power must have either 0, 1, 5, or 6 for its units digit.
 - (15) What is the last digit in the number 3^{400} ?
 - (16) If p is prime and $a^2 \equiv b^2 \pmod{p}$, prove that $p \mid (a + b)$ or $p \mid (a - b)$.