Math 453 **Homework 7** **Due Fri., Oct. 27, 2005**

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1. (ungraded) – §2.8 – 2.

2. (ungraded) – §2.8 – 3.

3. (ungraded) – §2.8 – 8, 10.

4. (graded) – §2.6 – 5. (Solution in back; show your work.)

5. (graded) – §2.7. – 2. (Hint: I think it's easier to factor; consider $x = 1$ first.)

6. (graded) – §2.8 – 13.

7. (graded) – ($\mathcal{E}$) a. Solve the congruence $x^2 \equiv 1 \mod 253$. It helps to observe that $253 = 11 \cdot 23$ and to think about the Chinese Remainder Theorem.
b. Solve the congruence $x^2 \equiv 1 \mod p(2p+1)$ when p and $2p+1$ are both odd primes. It helps to think about a.

8. (graded) – ($\mathcal{E}$) Solve the equation $x^3 \equiv 2 \mod 5^k$ for $k = 1, 2, 3, 4$.

9. (graded) – ($\mathcal{E}$) Compute $ord_{1085}(2)$. (Note: $1085 = 5 \cdot 7 \cdot 31$.)

10. (graded) – ($\mathcal{E}$) You are told that 3 is a primitive root modulo 353. Given this information, solve the equation $x^8 \equiv 1 \mod 353$. Leave your answer in the form $x \equiv 3^{k_j} \mod 353$ for specific integers $k_1, \ldots$ (as many as you need.)

11. (bonus) – §2.7 – 13.

12. (bonus) – §2.8 – 23.

13. (bonus) – §2.8 – 26.