

1. – §4.2 – 9 (ungraded).
2. – §4.4 – 1 (ungraded).
3. – §6.1 – 13 (ungraded).
4. – §4.2 – 8.
5. – §4.4 – 4. (Hint: $81 = 3^4$.)
6. – §6.1 – 2.
7. – §6.1 – 14.
8. – (E) a. Solve the congruence $x^2 \equiv 1 \pmod{253}$. It helps to observe that $253 = 11 \cdot 23$ and to think about the Chinese Remainder Theorem.
b. Solve the congruence $x^2 \equiv 1 \pmod{p(2p+1)}$ when p and $2p+1$ are both odd primes. It helps to think about 8a.
9. – (E) Solve the simultaneous congruence equations
 - (i) $x \equiv 5 \pmod{6}$ and $x \equiv 3 \pmod{10}$;
 - (ii) $y \equiv 5 \pmod{6}$ and $y \equiv 4 \pmod{10}$.for integers x and y . What, if anything, can you say about x and $y \pmod{60}$? The Chinese Remainder Theorem does not apply directly, since $\gcd(6, 10) = 2 > 1$, but it is not completely useless if you first think about the situation more carefully.
10. – (E) Solve the equation $x^3 \equiv 2 \pmod{5^k}$ for $k = 1, 2, 3, 4$.