

## Math 115. Homework 7

*Due Wednesday 23 October*

**Section 2.8 (Page 107):** 8, 13, 16, 19, 20, 21, 22

**Additional problem #1.** (This problem gives part of the proof of Lemma 2.34 given in the handout. Your solutions should not rely on Lemma 2.34, and ideally should not use ideas from its proof.)

Let  $m \in \mathbb{Z}_{>0}$ . Suppose that  $a$  and  $b$  have orders  $h$  and  $k$ , respectively, modulo  $m$ , and that  $\gcd(h, k) = 1$ . Let  $r, s \in \mathbb{N}$ . Show that if  $a^r b^s \equiv 1 \pmod{m}$ , then  $a^r \equiv 1 \pmod{m}$  and  $b^s \equiv 1 \pmod{m}$ .

**Section 2.9 (Page 114):** 1a, 2, 7