Congruence

1. Prove Theorem 2.7.3 (ii).

2. Prove that two integers are congruent modulo 2 if and only if they are either both odd or both even.
   (Note: We say that an integer $n$ is even if $n = 2k$ for some $k \in \mathbb{Z}$. We say that an integer $n$ is odd if $n = 2k + 1$ for some $k \in \mathbb{Z}$.)

3. Prove Theorem 2.7.5.

4. Prove Theorem 2.7.6.

5. Prove Theorem 2.7.7.

6. Prove Corollary 2.7.8. (Hint: Use Theorem 2.7.7 and induction on $k$.)

7. Prove Proposition 2.7.16.

8. Prove Theorem 2.7.17.