1. Dummit and Foote Problems 6 and 8 on pages 21–22

2. Define a relation ∼ on \( \mathbb{R} \) given by \( a \sim b \) if \( a - b \in \mathbb{Z} \).
   
   (a) Prove that ∼ is an equivalence relation.

   (b) Let \( \mathbb{R}/\mathbb{Z} \) denote the set of equivalence classes of ∼. Prove that the binary operation + on \( \mathbb{R}/\mathbb{Z} \) given by
   
   \[ \overline{a} + \overline{b} = \overline{a + b} \]

   is well-defined.

   (c) Is \( (\mathbb{R}/\mathbb{Z}, +) \) a group?

3. Dummit and Foote Problems 4, 6, 7 on page 11

4. Dummit and Foote Problems 11, 12, 20, 25 on page 21–22