

**MATH 1530 ABSTRACT ALGEBRA**  
**PROBLEM SET 2, DUE TUESDAY FEBRUARY 7 1PM IN CLASS**

1. Dummit and Foote Problems 6 and 8 on pages 21–22
2. Define a relation  $\sim$  on  $\mathbb{R}$  given by  $a \sim b$  if  $a - b \in \mathbb{Z}$ .
  - (a) Prove that  $\sim$  is an equivalence relation.
  - (b) Let  $\mathbb{R}/\mathbb{Z}$  denote the set of equivalence classes of  $\sim$ . Prove that the binary operation  $+$  on  $\mathbb{R}/\mathbb{Z}$  given by
$$\bar{a} + \bar{b} = \overline{a + b}$$
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