

1. Show that  $S = \{(x, x) \mid x \in R\}$  is a subring of  $R \oplus R$ . (Note: see Example 7 on p.247 for the direct sum of rings).
2. Show that  $\mathbb{Q}(\sqrt{3}) = \{a + b\sqrt{3} \mid a, b, \mathbb{Q}\}$  is a subring of  $\mathbb{R}$ .
3. Explain why  $GL(2, \mathbb{R})$  and  $SL(2, \mathbb{R})$  are not a rings.