

Exercise Sheet 2

Exercise 1

Solution

1. $\mathbb{Z} \times \mathbb{Z}$ is not a Dedekind domain as it is not even an integral domain. Take $(1, 0) \in \mathbb{Z} \times \mathbb{Z}$ and $(0, 1) \in \mathbb{Z} \times \mathbb{Z}$ for example. $(1, 0) \cdot (0, 1) = (0, 0)$ even though we chose nonzero elements.
2. We have $\mathbb{Z}[X]/(X^2 + 3) \cong \mathbb{Z}[\sqrt{-3}]$; therefore, $\mathbb{Z}[X]/(X^2 + 3)$ is an integral domain.