



MODERN ALGEBRA
SPRING 2025

ASSIGNMENT 2.1
DUE FEBRUARY 5

Exercise 1. Let $n \in \mathbb{N}$ and $a \in \mathbb{Z}$ with $\gcd(a, n) = 1$.

- a. Use Bézout's Lemma to write $ra + sn = 1$ for some $r, s \in \mathbb{Z}$. Conclude that $R_n(a) \in U(n)$.
- b. With r, s as above, explain why we also have $R_n(r) \in U(n)$. Show that $R_n(r) \otimes R_n(a) = 1$ in $U(n)$.

Exercise 2. Textbook exercise II.1.6.

Exercise 3. Textbook exercise II.1.3.