



NUMBER THEORY
FALL 2023

ASSIGNMENT 2.1
DUE SEPTEMBER 6

Exercise 1. Let $a, b \in \mathbb{Z}$ with $a \neq 0$. Use the Pigeonhole Principle to show that if we apply the Division Algorithm to divide the consecutive integers $b, b + 1, b + 2, \dots, b + (|a| - 1)$ by a , then every possible remainder occurs exactly once.

Exercise 2. Textbook exercise 2.2.11. [*Suggestion.* Start by writing $n^4 + 4n^2 + 11 = (n^2 + 2)^2 + 7$.]

Exercise 3. Textbook exercise 2.3.12.

Exercise 4. Textbook exercise 2.3.14.