

Homework 1

*Instructor: Colleen Robichaux**Due by 10/05 at 5PM through GradeScope***Exercises** (from textbook and additional exercises (A.E.) below):

- 1.1 - 14, 15, 24, 25, 38, 56
- 3.1 - 19, A.E. 1
- 2.2 - 36, A.E. 2
- 2.4 - 2, 3, 9, 23
- 3.2 - 12, A.E. 3, A.E. 4

ADDITIONAL EXERCISE 1. Let $f(x) = x \pmod{5}$, where $x \in \mathbb{Z}$. Answer the following yes/no (no justification needed):

- (a) Is f injective? (b) Is f surjective? (c) Is f bijective?

ADDITIONAL EXERCISE 2. Show $6n^2 + 2m^2 + 1 = 2(n + m)$ has no solutions for $n, m \in \mathbb{Z}_{>0}$.

ADDITIONAL EXERCISE 3. Find closed formulas for the following sequences:

- (a) 4, 6, 8, 10, 12, 14, \dots (b) $1, \frac{-2}{3}, \frac{3}{15}, \frac{-4}{63}, \frac{5}{255}, \dots$

ADDITIONAL EXERCISE 4. Each of the following sequences have domain $\mathbb{Z}_{>0}$. For each, compute its first five terms and state whether it is or is not increasing, decreasing, nonincreasing, and nondecreasing.

- (a) $a_n = 2n! - 1$ (b) $b_n = 2^n - n$ (c) $c_n = 2^n - n^3$ (d) $d_n = \frac{(-1)^n}{n^3}$