6 Lab 6 – March 24, 2022

6.1 Find all natural numbers x, $0 \leq x < 555$ for which $233\,x \equiv 5 \pmod{555}$.

6.2 Find the remainder when you divide

$$13^{742} - 10 \cdot 14^{521} + 22^{102}.$$

by 7.

6.3 Find the remainder when you divide

$$4^{254} + 2 \cdot 7^{123} - 3 \cdot 11^{102}.$$

by 5.

6.4 Derive and prove criteria for divisibility by 7 and 11.

6.5 Write down the table of addition and multiplication in $\mathbb{Z}_6$ and in $\mathbb{Z}_7$.

6.6 Find all invertible elements in $(\mathbb{Z}_{11}, \odot)$ and their inverses.

6.7 In $\mathbb{Z}_{267}$ find all x for which

$$114\,x = 3.$$

6.8 In $\mathbb{Z}_{261}$ find all x for which

$$138\,x = 6.$$