

Math 406 – Fall 2025 – Harry Tamvakis
PROBLEM SET 6 – Due October 23, 2025

Reading for this week: Sections 6, 7, and 8.

Problems

From the textbook: Section 6, #11, 12, 19, 20, Section 7, #12, 16, Section 8, #2, 5, 7, 13. In addition, do the following problems:

A1) From Fermat's theorem deduce that 13 divides $11^{12n+6} + 1$ for all nonnegative integers n .

A2) a) Find the remainder when $13!$ is divided by 17.

b) Find the remainder when $2(28!)$ is divided by 31.

Extra Credit Problem.

EC) A *complete system of residues modulo n* is a set of n numbers such that no two of them are congruent modulo n . Let p be an odd prime and let $a_1, \dots, a_p$ and $b_1, \dots, b_p$ be complete systems of residues modulo p . Prove that $a_1b_1, \dots, a_pb_p$ is *not* a complete system of residues modulo p .