Math 105: Homework 3

Due October 24, 2025

Most questions are from the textbook but have been copied here for your convenience.

1. Find an integer n such that $\sigma(n) = 546$.
2. Let $\sigma_2(n)$ be the sum of the squares of positive divisors of n. Show that $\sigma_2(n)$ is multiplicative. [Hint: try to find a multiplicative function g such that $\sigma_2 = S_g$ and use the Theorem from class.]
3. Find all integral solutions of $33x - 12y = 9$.
4. Compute $132323 \times 2221 \pmod{17}$.
5. Compute $5^{39} \pmod{7}$.

As a reminder, please write clearly and fully explain your solutions. It is OK (and even encouraged) to work with your classmates to solve the problems, but if you do so, you should write your solutions up separately. Copying solutions from your peers or a solutions manual will be deemed academic misconduct. You are not allowed to search the internet and/or use LLMs to aid you in completing this homework.