MA 350 Number Theory – Spring 2024

Homework 7

Due: April 29, 2024

Submit your written work in Canvas as a single PDF file, and be sure to show your work. Answers without accompanying work will receive zero credit.

1. (5 points) Find $ord_5 3$.
2. (5 points) Show that 2 is a primitive root of 9.
3. (5 points) Explain why $ord_{37} b \neq 8$ for every b such that $\gcd(b, 37) = 1$.
4. (5 points) Let b be a primitive root of 41. Explain why b^{15} is not a primitive root of 41.
5. (5 points) Show that 54 has a primitive root. How many incongruent primitive roots does 54 have?
6. (5 points) Find all roots of the polynomial $x^3 + 6$ modulo 7.
7. (5 points) Find a complete set of incongruent primitive roots of 13.
8. (5 points) Let $n = b^m - 1$. Prove that m is the order of b modulo n.