

PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Exam 2

Number Theory

15–12–2013

Solutions must be complete in order to receive full credit.

1. Find a reduced residue system (RRS) modulo 10, using only prime numbers.
2. Evaluate $|2|_9$. Is 2 a primitive root modulo 9?
3. How many primitive roots exist modulo 98?
4. Evaluate $\phi(24000)$.
5. Solve the system of two congruences: $x \equiv 5 \pmod{6}$ and $x \equiv 1 \pmod{11}$.
6. Evaluate $2^{65354} \% 17$.
7. Solve the discrete logarithm problem $9^x \equiv 5 \pmod{11}$ using the primitive root $g = 2$.

–Amin Witno

The list of primes below 200.

2	3	5	7	11	13	17	19	23	29
31	37	41	43	47	53	59	61	67	71
73	79	83	89	97	101	103	107	109	113
127	131	137	139	149	151	157	163	167	173
179	181	191	193	197	199				