

PHILADELPHIA UNIVERSITY  
DEPARTMENT OF BASIC SCIENCES

Exam 2

Number Theory

18–12–2014

Solutions must be complete in order to receive full credit.

1. (4 pts) Compute  $103! \% 107$  using Wilson's theorem.
2. (4 pts) Find all the integer solutions for the system of three congruences.

$$x \equiv 1 \pmod{3}$$

$$x \equiv 3 \pmod{5}$$

$$x \equiv 5 \pmod{8}$$

3. (4 pts) Compute  $2^{13579} \% 19$  using Fermat's little theorem.
4. (4 pts) Find all the integer solutions for the congruence  $x^{23} \equiv 5 \pmod{55}$ .
5. (2 pts) Evaluate  $\phi(2016)$ .
6. (2 pts) Find all the primitive roots modulo 13.

–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				