

PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Exam 2

Number Theory

12-12-2012

Solutions must be complete in order to receive full credit.

1. Solve the system of three congruences.

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

$$x \equiv 3 \pmod{6}$$

$$x \equiv 5 \pmod{7}$$

2. Find a reduced residue system (RRS) modulo 9, using only prime numbers.
3. Evaluate $2^{121212} \% 35$ with the help of Euler's theorem.
4. Find all the primitive roots modulo 10.
5. How many primitive roots exist modulo 250?
6. Solve the discrete logarithm problem $7^{2x} \equiv 3 \pmod{11}$ 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				