



PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Second Exam

NUMBER THEORY

20-12-2005

Problems 1,2,3,4 are two points each and 5,6,7 are four points each.

1. The congruence $15x \equiv 12 \pmod{33}$ has a particular solution $x_0 \equiv 3 \pmod{33}$. Find all the solutions.
2. Find all positive integers ≤ 18 which have an inverse modulo 18.
3. The number 6553 is a prime. Compute $2^{6555} \pmod{6553}$. Which Theorem are you using?
4. The number 6553 is a prime. Compute $6551! \pmod{6553}$. Which Theorem are you using?
5. Find the last two digits of the number 677^{4478} .
6. Find an integer x such that $x^{13} \equiv 2 \pmod{85}$.
7. I have 2 dinars and some piasters in my MobileCom prepaid account. If I use it all for sending SMSs for 3 piasters each then 2 piasters will be left. If I use it all for local calls for 5 piasters each then 4 piasters will be left. If I use it all for sending MMSs for 8 piasters each then 7 piasters will be left. How much credits do I have exactly?