ÇANKAYA UNIVERSITY
Department of Mathematics and Computer Science

MATH 365
Elementary Number Theory I
Second Midterm Practice Exam B

December 17, 2007
16:40 – 18:00

In the first eight problems, tell whether or not each sequence given is a complete residue system modulo 6.

1. $-3, -2, -1, 1, 2, 3$

2. $0, 5, 10, 15, 20, 25$

3. $0, 3, 6, 9, 12, 15$

4. $n = 81$

5. $0, 1, 2, 3, 4, 5, 6$

6. $1, 2, 4, 8, 3, 5$

7. $7, 14, 21, 28, 35$

8. $5, -5, 4, -4, 3, 60$

In the next eight problems, tell whether each list of values of x forms a complete solution to the given congrunce.

9. $x = 4; 2x \equiv 8 \pmod{6}$

10. $x = 4, 10; 2x \equiv 8 \pmod{6}$

11. $x = 4; 2x \equiv 8 \pmod{9}$

12. $x = 4, 10; 10x \equiv 4 \pmod{12}$

13. $x = 0; 6x \equiv 4 \pmod{12}$

14. $x = 3, 7; 3x \equiv 9 \pmod{12}$

15. $x = 4; x^2 \equiv 2 \pmod{7}$

16. $x = 7; x^2 + x \equiv 1 \pmod{5}$

In the next eight problems, tell the number of elements in a complete solution
17. $5x \equiv 100 \pmod{55}$

18. $11x \equiv 14 \pmod{23}$

19. $91x \equiv 169 \pmod{143}$

20. $91x \equiv 169 \pmod{140}$

21. $1001x \equiv 143 \pmod{99}$

22. $48x \equiv 128 \pmod{1000}$

23. $x^2 + x + 1 \equiv 0 \pmod{14}$

24. $x^2 + x + 1 \equiv 0 \pmod{91}$

In the next ten problems, give the least complete solution to the congrunce.
25. $6x \equiv 2 \pmod{8}$

26. $36x \equiv 30 \pmod{42}$

27. $25x \equiv 100 \pmod{35}$

28. $143x \equiv 169 \pmod{110}$

29. $27x \equiv -18 \pmod{15}$

30. $51x \equiv 0 \pmod{17}$

31. $3x \equiv 18 \pmod{18}$

32. $253x \equiv 341 \pmod{299}$

33. $165x \equiv 84 \pmod{221}$

34. $441x \equiv 465 \pmod{640}$

35. Find all x, $0 \leq x \leq 9$ such that $5x \equiv 15 \pmod{10}$.

36. Find all x, $|x| < 5$, such that $5x \equiv 20 \pmod{10}$.

37. Find all x, $100 \leq x < 110$ such that $6x \equiv 2 \pmod{10}$.

38. Find all x, $100 \leq x < 110$ such that $6x \equiv 9 \pmod{15}$.