Solutions for Test 1

11:10-13:00, April 23, 2010

1. **(a)** $(x, y) = (121, -8)$, **(b)** $x = 121$.

2. $x \equiv 3y + 22$ *mod* 26, *nthuhasabeautifulcampus*

3. *foxkoalax*

4. $x = 43,\ 56,\ 87,\ 100$

5. **(a)** 25, **(b)** 41.

6. By Fermat little theorem, show that $(7-1)|90$, $(11-1)|90$, and $(19-1)|90$

7. **1001**, where $x_{n+3} \equiv 1 \cdot x_{n+2} + 0 \cdot x_{n+1} + 1 \cdot x_n \ (mod\ 2)$

8(a) $\phi(1) = 1,\ \phi(2) = 1,\ \phi(5) = 4,\ \phi(10) = 4$

8(b) $\phi(1) = 1,\ \phi(2) = 1,\ \phi(3) = 2,\ \phi(4) = 2,\ \phi(6) = 2,\ \phi(12) = 4$

8(c) $\sum_{d|15} \phi(d) = 15$

8(d) $\sum_{d|n} \phi(d) = n,\ \forall\ n \in N = Z^+$.

9(a) $ord_{10}(3) = 4$ and $ord_{11}(3) = 5$.

10(b) $x = 327$