

Homework 5, due September 14

- (1) Find all solutions modulo 17, 97, and 105, respectively, to the congruences $5x + 3 \equiv 9 \pmod{17}$, $18y - 23 \equiv 5 \pmod{97}$, and $14x + 3 \equiv 10 \pmod{105}$. Show your work.
- (2) Let a be a positive integer with $\gcd(a, 26) = 1$. Suppose $A = 0, B = 1, C = 2$, etc. Why will the function $x \mapsto ax^2 \pmod{26}$ not work as a cipher system? For example, if $a = 11$, then $C = 2 \mapsto 11 \cdot 2^2 \equiv 18 \pmod{26} = S$.
- (3) For the following ciphertext, the first part was encrypted by a shift cipher. Decrypt both parts.

DROXOHDMSZROBSCKPPSXODROPSBCDDGYVODDOBCKBOIY
VJLKNATDXKHTHAXAPIHTYTHJHCHTNIRJTFCFKCNHAI V FJKKXFC