

## Notes for October 25, 1999

1. Greetings and Felicitations!
  - a. Bibliography: I'll have copies made for Monday or Wednesday of next week
  - b. Program hints: see newsgroup. Should I extend homework due date to Wednesday?
2. Puzzle of the Day
3. Specification Detection
  - a. Look for violations of specifications
  - b. Basis: need a representation of specifications
  - c. Issues: similar to misuse detection
  - d. Advantage: can detect attacks you don't know about.
4. Cryptography
  - a. Ciphers v. Codes
  - b. Attacks: ciphertext-only, known plaintext, known ciphertext
5. Classical
  - a. monoalphabetic (simple substitution):  $f(a) = a + k \bmod n$
  - b. example: Caesar with  $k = 3$ , RENAISSANCE  $\rightarrow$  UHQDLVVDQFH
  - c. polyalphabetic: Vigenère,  $f_i(a) = (a + k_i) \bmod n$
  - d. cryptanalysis: first do index of coincidence to see if it's monoalphabetic or polyalphabetic, then Kasiski method.
  - e. problem: eliminate periodicity of key
6. Long key generation
  - a. Running-key cipher: M=THETREASUREISBURIED; K=THESECONDCIPHERISAN; C=MOIL-VGOFXTMXZFLZAEQ; wedge is that (plaintext,key) letter pairs are not random (T/T, H/H, E/E, T/S, R/E, A/O, S/N, etc.)
  - b. Enigma/rotor systems; wheels, 3 rotors and a reflecting one. Go through it; UNIX uses this for *crypt(1)* command.
  - c. Perfect secrecy: when the probability of computing the plaintext message is the same whether or not you have the ciphertext
  - d. Only cipher with perfect secrecy: one-time pads; C=AZPR; is that DOIT or DONT?
7. DES
  - a. Go through the algorithm
8. Public-Key Cryptography
  - a. Basic idea: 2 keys, one private, one public
  - b. Cryptosystem must satisfy:
    - i. given public key, CI to get private key;
    - ii. cipher withstands chosen plaintext attack;
    - iii. encryption, decryption computationally feasible [note: commutativity *not* required]
  - c. Benefits: can give confidentiality or authentication or both
9. Use of PKC
  - a. Normally used as key interchange system to exchange secret keys (cheap)
  - b. Then use secret key system (too expensive to use PKC for this)