Notes for October 30, 1998

1. Greetings and Felicitations!
2. Puzzle of the Day
3. Classical Ciphers
   a. monoalphabetic (simple substitution): $f(a) = a + k \bmod n$
   b. example: Caesar with $k = 3$, RENAISSANCE → UHQDLVVDQFH
   c. polyalphabetic: Vigenère, $f_i(a) = (a + k_i) \bmod n$
   d. cryptanalysis:do index of coincidence to see if it's monoalphabetic or polyalphabetic, then Kasiski method.
   e. problem: eliminate periodicity of key
4. 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?
5. DES
   a. Go through the algorithm
6. 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 authentiction or both
7. 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)