1. General Concepts about Computer Communication and Networking
   * Connection-oriented Service
     1. transport data at the session layer
     2. connection between the sender and receiver is required
   * Connection-less Service
     1. transfer data at the transport layer
     2. connection between the sender and the receiver is not required
   * Protocol
     1. Set of rules sender and receiver agree for communication
     2. 3 aspects
        1. Syntax: message format
        2. Semantics: meaning of each field
        3. Timing: when to send messages
   * Interface
   * Differences of a Network Service, Protocol, and Networking Application
   * Five TCP/IP Layers
     1. Physical layer
     2. Data link layer
     3. Network layer
     4. Transport layer
     5. Application layer
   * Definition of a PDU
     1. Protocol Data Unit
        1. Data moves from one OSI layer to another
   * Names of PDUs for TCP/IP five layers
     1. Physical: Bit
     2. Data Link: Frame
     3. Network: Packet
     4. Transport: Network Segment
2. Physical Layer Functions:
   * Encoding/Decoding:
   * NRZ,
     1. Down when 1, up when 0
   * NRZ-I
     1. Change sides when 1
   * Manchester,
     1. 0 = curve down, 1 = curve up
   * Differential Manchester
     1. 1= transition, 0 = other side and come back
   * Modulation/Demodulation: ASK, FSK, PSK, and (optional) QAM
   * Switching: purpose
     1. Saving the #s of links
   * Multiplexing: purpose
     1. Allow several cables to share one broadband cable
3. Data Link Layer Functions:
   * Framing
     1. Padding a packet with a frame header and frame trailer
   * Bit-Level Error Detection:
     1. Parity Bit
        1. Checks if there is even number of 1s
     2. CRC
        1. Mutiple bit error detection
   * Frame-Level Error Recovery: (optional) ABP, GBN, and SR
4. MAC Sub-Layer Functions:
   * Changes needed when moving from WAN to LAN
     1. Distance problems
        1. Length of cables (wide area vs local area)
   * Categories of MAC protocols
     1. Collision Free
        1. Collisions occur when 2 or more hosts try to send data frames at the same time
     2. Random Access
5. Details about Random Access Protocols:
   * CSMA/CD
     1. Listens
     2. Transmits
     3. If busy starts binary exponential back off
     4. If idle, but detects collision, sends jamming signal, aborts transmission
   * Binary Exponential Back-off
     1. After n amount of collisions, wait 0 to 2^n-1 times (16 max)
6. Details about Ethernet:
   * Addressing Scheme
     1. 6-byte physical address identifies source and destination
   * Naming convention
     1. 10base5, 10base2, 10base-T, 10baseF
   * Definitions: Baseband vs. Broadband
     1. Baseband: digital
     2. Broadband: analog