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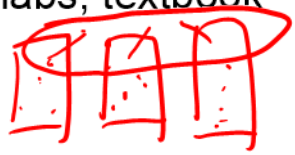
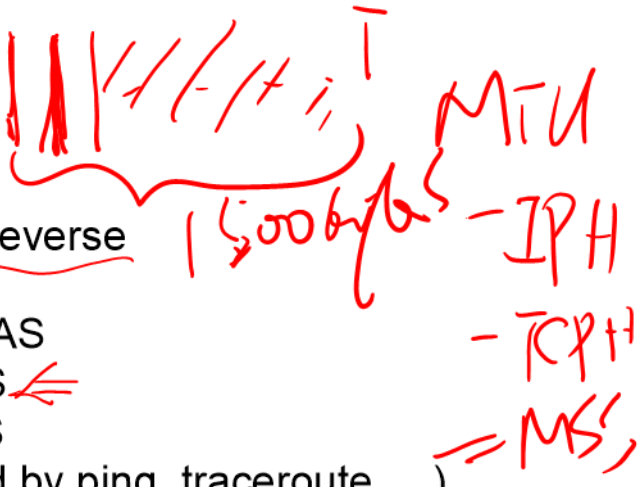
Final exam: April 16, courses.uvic.ca

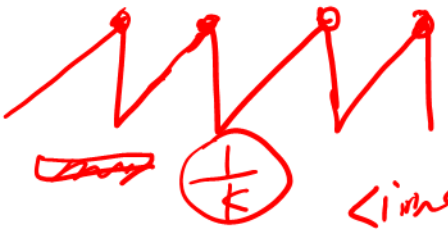
- Open book (but no online resources, nor communications in any way with other people during the exam); Calculator is allowed
- Preparation: lecturer notes/slides, assignments, labs, textbook



1. Network layer:
   * IP Protocol
     - IP address: address classes; CIDR (classless inter-domain routing)
       NAT: how LAN side vs. WAN side addresses
     - Fragment and reassemble (how to calculate length, fragoffset, fragflag, ...)
     - MTU: IP header + TCP header + ...
   * Routing algorithms
     - flooding
     - link state routing (Dijkastra)
     - distance vector routing (Bellman-Ford)
       count-to-infinity problem and poisoned reverse
   * Routing protocols
     - RIP (routing information protocol) intra-AS
     - OSPF (open shortest path first) intra-AS
     - BGP (border gateway protocol) inter-AS
   * Network layer control protocol: ICMP (used by ping, traceroute, ...)
   * ARP <IP address, MAC address, TTL>



2. Transport layer protocol
   * TCP, UDP => common: multiplexing/demultiplexing using port number
   * TCP
     - connection management
     - flow control (rwnd), throughput limit: rwnd/rtt (byte/sec)
     - error control: duplication; out-of-order; corrputed; lost
     - congestion control
       cwnd, ssthresh
       three stages: slow-start; congestion avoidance; exponential backoff
     - wnd = min (rwnd, cwnd, ...)
     - TCP throughput, loss event rate
     - TCP fairness



3. Application layer
   * WWW: HTML; HTTP (1.0 vs 1.1), pipeline vs. non-pipeline
   * DNS: hierarchical domain name space; hierarchical DNS system; recursive vs. iterated
   * Email: UA, MTA, SMTP, ...

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