If you are ready for Quiz #2, you should be able to:

- describe the mission, scope, addressing mechanism, data types and responsibilities of the Transport Layer.
- explain UDP, including advantages/disadvantages, segment format, and reliability assumptions.
- calculate the checksum of a UDP segment.
- describe the purpose, limitations and variations in usage of each RDT tool--checksums, receiver feedback, retransmission, sequence numbers, timer expiration, window--as well as the network faults each is designed to overcome.
- describe and analyze RDT protocols (including Stop-n-Wait, Go Back N & Selective Repeat) in order to show how each RDT tool is employed.
- describe how changes to the employment scenario for a protocol affects the protocol design choices. An example is receiver-side buffering.
- describe the requirements and features of TCP.
- describe the segment format of TCP.
- calculate MSS from the relationship of MTU, Network and Transport header sizes.
- describe the operations behind establishing and tearing-down a TCP connection.
- describe the operation of sender and receiver in reliably transferring data across the TCP connection. This description should include events occurring at the sender (including fast retransmision optimizations) and receiver, as well as scenarios whereby error conditions are overcome.
- describe the mission, operation and mechanisms for flow control in TCP.
- list causes, costs and consequences of network congestion.
- describe the operations of, as well as advantages and disadvantages of, different feedback mechanisms.
- describe the overall congestion control mechanisms used in TCP, including the congwin variable, self-clocking nature, and interaction of various phases.
- describe the slow start component of TCP congestion control; including starting conditions, reactions to ACKs and ending conditions.
- describe the congestion avoidance component of TCP congestion control; including starting conditions, ending conditions, reactions to loss, reactions to ACKs and differences between Reno and Tahoe versions.
- describe how TCP sets timeout values.
- calculate EstimatedRTT, DevRTT and TimeoutInterval.
- describe features of the following TCP congestion control variations: New Reno, Vegas, Hybla, BIC and Compound TCP.
- describe the advantages and disadvantages of delay-based variants.
- describe the challenges of congestion control for LFNs.

- describe the problems and attractions of a non-cooperative TCP implementation.
- describe the mission, scope, addressing mechanism, data types and responsibilities of the Network Layer.
- describe the differences that would result from a connectionless or connection-oriented network.
- explain IPv4, including advantages/disadvantages, datagram format, and packet-handling operations at each router.
- calculate the packets that result from an IPv4 fragmentation scenario, including size, id, flags and offset fields.
- calculate IPv4 address ranges from prefix notation and be able to apply the longest matching prefix rule to forwarding decisions.
- apply route aggregation to prefix scenarios.
- describe ICMP, including packet format, use of type/code fields for ping, traceroute, and error situations.
- describe the differences between global / decentralized and static / dynamic routing algorithms. Students should be able to describe different message complexity, convergence speeds, robustness and algorithm complexity.
- calculate a forwarding table using Dijkstra's algorithm (which may include identifying and using proper variables and terms). Intermediate results may be required, such as an SPT or table of variable values.
- use Bellman-Ford equations to calculate a forwarding table for a DV routing algorithm. Intermediate values may be required, which may require knowing variable names and terms.
- describe how DV algorithms operate to pass updates.
- describe DV instability problems, such as "Count to Infinity" and the associated stabilization techniques.
- analyze DV instability examples.
- describe heirarchical routing and describe how it solves the scale and administrative autonomy problems of internet-scale routing.
- describe AS and ASNs, including common ASN scenarios.
- identify and describe the following IGPs: OSPF, IS-IS, RIP, EIGRP.
- describe the hierarchy features of OSPF.
- describe how the architecture of RIP allows it to use UDP.
- describe the mission, operation, operating state, neighbor relations and message types of BGP4.
- describe the use of the AS-PATH, NEXT-HOP, MED and LOCAL-PREF attributes.
- describe how BGP route announcements propagate through the network and show how the attributes are changed in response.

- describe how BGP interacts with the IGP to populate the forwarding table.
- describe BGP route processing inside the router, including how the router decides if it should "filter" a packet (hint: it never decides to "filter" a packet).
- describe DHCP, including information carried, methods of communication, leases, message format and the discovery process.
- describe NAT, including benefits / objections, operations and port forwarding.
- describe situations where NAT needs to modify values other than IP address and TCP/UDP port fields.
- describe IPv6, including differences with IPv4, benefits, datagram format, and address notation.
- describe IPv6 address autoconfiguration.
- describe the purposes of network measurement, both from a short-term and longer-term perspective.
- describe the uses of basic measurement tools (packet traces, SNMP counters, ping, traceroute).
- describe the use of netflow tools and how they differ from other measurement tools. Be able to solve problems requiring knowledge of the flow definition, flow record, sampling methods and flow aggregation.
- analyze a scenario to pick the most appropriate measurement tool.
- prove you did the readings by answering general, large-concept questions about them.