True/False:

1. One computer can only have one network card.
False: It may have more than one: e.g. one card for wired network, and one for wireless network.

2. Network card vendor assigns port number.
False: Port number is an 16-bit identifier assigned by app or OS.

3. All hosts in a LAN can share same physical communication media.
True.

4. Usually, router stores an entry for each individually IP address in its forwarding table.
False. One entry represents IPs with a common prefix.

5. A store-and-forward router starts forwarding the packet as soon as it gets packet's header.
False: The router waits to receive the entire packet before forwarding it, hence the store-and-forward name. This allows a router to enqueue packets if the output link is congested, and drop a packet if it has been corrupted.

Short Answer:

1. What are two operations in a key/value store?
Answer:
-- Put(key, value)
-- Get(key)

2. What is a protocol?
Answer: A protocol is an agreement on how to communicate. Includes:
a. Syntax: how a communication is specified & structured
b. Semantics: what a communication means

3. What does IETF mean?
Answer: Internet Engineering Task Force

4. What does RFC mean?
Answer: Request For Comments

5. What is network (interface) card/controller?
Answer: Hardware that physically connects a computer to the network

6. What is MAC address?
Answer:48-bit unique identifier assigned by card vendor.

7. What is IP address?
Answer: 32-bit (or 128-bit for IPv6) address assigned by network administrator or dynamically when computer connects to network

8. How many layers in Internet Protocol? What main service does each layer provide?
Answer:
Five layers.
– Physical: send bits
– Datalink: Connect two hosts on same physical media
– Network: Connect two hosts in a wide area network
– Transport: Connect two processes on (remote) hosts
– Applications: Enable applications running on remote hosts to interact

9. Drawbacks of Layering
Answer:
• Layering can hurt performance
– E.g., hiding details about what is really going on
• Headers start to get really big
– Sometimes header bytes >> actual content
• Layer N may duplicate layer N-1 functionality
– E.g., error recovery to retransmit lost data
• Layers may need same information
– E.g., timestamps, maximum transmission unit size

Long Answer:

1. What are recursive query and iterative query in a distributed key/value store. What are their advantages and disadvantages in terms of performance.
Answer:
Recursive query: Having master to relay the request.
Iterative query: Master returns the node to requester, and let requester contact node containing data directly.

Recursive query:
Advantage:
a. Faster, as typically master/directory closer to nodes
b. Easier to maintain consistency, as master/directory can serialize puts()/gets()
Disadvantage: scalability bottleneck, as all “Values” go through master/directory

Iterative query:
Advantage: more scalable
Disadvantage: slower, harder to enforce data consistency

2. Compare TCP and UDP.
Answer:
• Datagram service (UDP)
– No-frills extension of “best-effort” IP
– Multiplexing/Demultiplexing among processes
• Reliable, in-order delivery (TCP)
– Connection set-up & tear-down
– Discarding corrupted packets (segments)
– Retransmission of lost packets (segments)
– Flow control
– Congestion control