**CS 372 Introduction to Computer Networks**
**Self-Check Exercises: Lecture 33** **Solutions**

1) What was the initial motivation for IPv6?
The forthcoming exhaustion of the IPv4 address space (running out of IP addresses).

2) What are three significant changes from IPv4 to IPv6?
- Address size (32b to 128b)
- "Flow labels" to label types of datagram payload.
- No more network core IP datagram fragmentation (Check path MTU & fragment before transmission)
- Removed IP Checksum (which had to be re-calculated at each node because of TTL field)
- ICMPv6
- more answers possible…

3) What is the IPv6 representation of the IPv4 address 152.35.44.122 ?
::ffff:9823:2c7a

4) Which of the following are valid representations of the IPv6 address?
5002:0000:0000:000a:0000:0000:0000:04cb (See RFC5952 for reference)

| | | |
|---|---|---|
| 5002:0:0:A::4CB | _N_ | Hex letters must be lower case. |
| 5002:0:0:a::4cb | _Y_ | |
| 5002::a:0:0:0:4cb | _N_ | The longest set of 0:0 must be concatenated with :: |
| 5002::a::4cb | _N_ | Only one set of 0:0 may be concatenated with :: |

5) In IPv6, what do the following header fields indicate?
- Payload Length: Length in bytes of the payload field (data field) of this datagram.
- Hop Limit: Number of hops remaining before datagram is discarded.
- Next Header: The type (which can be associated with length) of the first extension header.

6) How is the transition from IPv6 to IPv4 being made?
Tunneling. Packing IPv6 datagrams and putting them within IPv4 datagrams, with the destination address being that of the next IPv6-capable router in the path to the final destination.

7) Why not just convert the datagram to an IPv4 datagram from that point onward?
IPv6 datagrams may have information that is not preserved in an IPv4 datagram (such as Flow labeling).