ECE 363 Spring 2026 Assignment 5 Solutions

1. This is possible because the IP addresses of the machines are different.

   If a NAT box is used, the external IP addresses of the machines is the same, but the NAT box internal port mapping still allows them to use the same port number

2. An error in the header is much more serious than an error in the data

   for example, a bad address could result in a packet being delivered to the wrong host. Many hosts do not check to see if a packet delivered to them is in fact really for them. they assume the network will never give them packets intended for another host.

   Data is also not checksummed because doing so is expensive, and upper layers often do it anyway, making it redundant here

3. The allocation for flow A will be ½ on links

R1-R2 and R2-R3

The allocation for flow E will be ½ on links

R1-R2 and R2-R6

All other allocations remain the same

4. UDP on host A will use 800 kbps, leaving only 200 kbps for TCP on host B

5. No, a connection is identified only by its sockets.

Thus, (1, p), (2, q) is the only possible connection between these two ports

6. The ACK bit is used to tell whether the 32-bit field is used

If this bit were not there the 32-bit field would always have to be used, if necessary acknowledging a byte that had already been acknowledged

Thus, it is not essential for normal data traffic

However, it does play a crucial role during connection establishment where it is used in the second and third messages of the three-way handshake

7. IP is a network level protocol while TCP is an end-to-end transport level protocol. Any change in the protocol specification of IP must be incorporated on all routers in the Internet

On the other hand, TCP will work fine as long as the two end points are running compatible versions. Thus, it is possible to have many different versions of TCP running at the same time on different hosts, but this is not the case with IP.