*CSE 473 – Introduction to Computer Networks* *Jon Turner*

# Quiz 4 Solution

*Your name here:* *10/29/2012*

1. (5 points) Consider two TCP flows that pass through a common link served by a single queue. Assume that both flows have the same *RTT*. Suppose that at time $t_0$, the queue is full, causing both flows to lose a packet. Suppose the senders for both flows detect the lost packet at time *t*. If the first flow has a congestion window size equal to 100**MSS* and the second has a congestion window size of 200**MSS* at time *t*, approximately how many packets will the first flow send during the next *RTT* following *t?*

   *In the case of TCP Tahoe, it will go back to slow start and send one packet in the next RTT.*

   *In the case of TCP Reno, it will cut its congestion window in half, allowing it to send 50 packets in the next RTT.*

   How many will the second flow send?

   *It the case of Tahoe, it will send 1 packet. In the case of Reno, it will send 100 packets.*

   At time *t*+50*RTT, approximately what will be the size of the congestion window for the first flow?

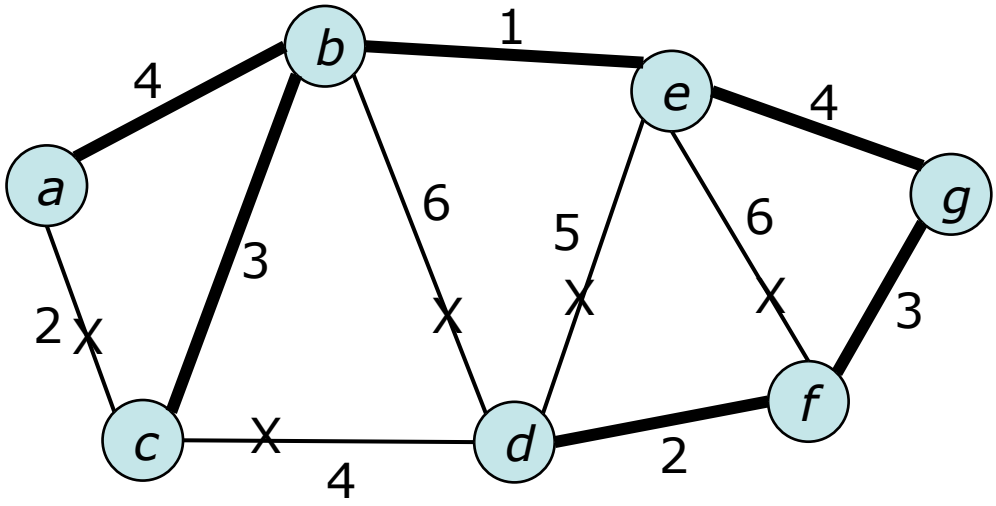
   *For Tahoe, it will double cwnd for the first five RTTs, then add 1*MSS per RTT. So, it should be about 95*MSS at t+50*RTT.*

   *For Reno, it increases by 1*MSS every RTT, so it should be about 100*MSS*

   What will be the size of the congestion window for the second flow?

   *For Tahoe, 145*MSS. For Reno, 150*MSS*

2. (5 points) The diagram below represents a network with the numbers on the edges representing link costs. If the network routes are computed using OSPF, which links would never be used to reach a host Z connected to router *g*? You may simply mark these edges with an X on the diagram. Assume that the topology is stable, that the link costs do not change and that *g* advertises a route to *Z*.




*The links shown in bold define a shortest path tree rooted at g. OSPF distributes complete information about the network to all routers and they each compute routes based on shortest paths. Consequently, all paths to g will use only edges in the shortest path tree, so the edges that are not used are the ones outside the tree (and marked with an X).*