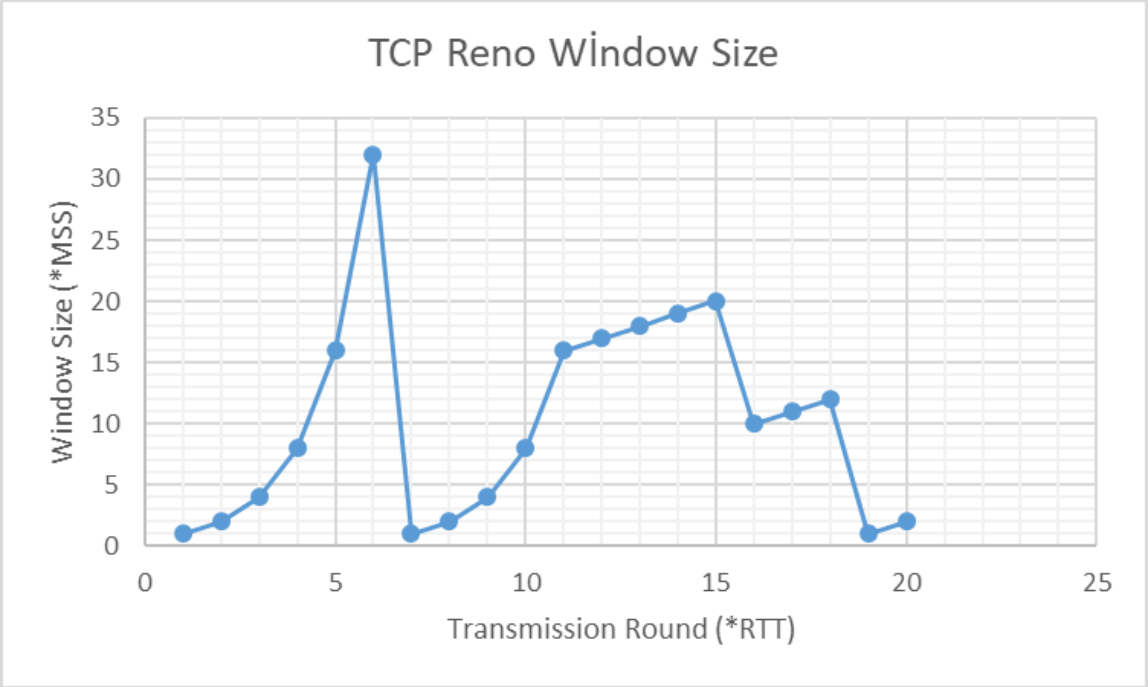
IS 504 – Homework #3

Due: January 2, 2024 Tuesday – 23:30

- Late submissions will be accepted by January 4, 2023, 08:30 with 15% penalty.
- This is an individual assignment. You have to adhere to the academic integrity principles.

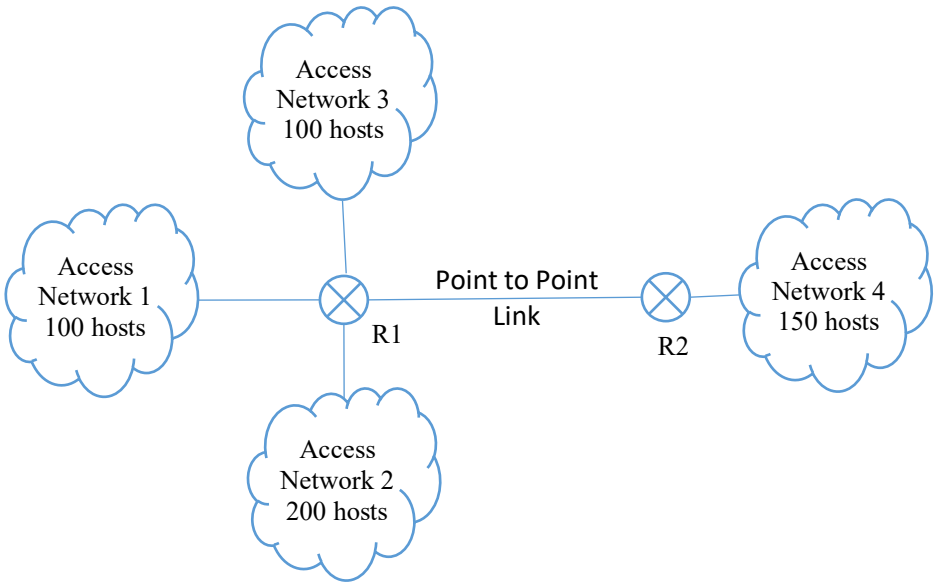
Questions

1. Suppose a host is downloading a very large video from a Web server, the server's congestion window evolves in time as shown in the following figure, and TCP Reno is used.



   a. (5 pts) Identify the interval(s) of time when TCP slow start is operating.
   b. (5 pts) Identify the interval(s) of time when TCP congestion avoidance is operating.
   c. (5 pts) Identify the transmission rounds in which segment losses occur and indicate how each loss is detected ("triple duplicate ACK" or "timeout").
   d. (5 pts) What is the value of slow start threshold (ssthresh) at the 7^{th} transmission round?
   e. (5 pts) What is the value of slow start threshold (ssthresh) at the 16^{th} transmission round?
   f. (5 pts) What is the value of slow start threshold (ssthresh) at the 20^{th} transmission round?
   g. (5 pts) What will be the window size in the 21^{st} round if no loss occurs in the 20^{th} round? Explain your reasoning.

2. Consider the following network that consists of four access networks with hosts and one point to point link interconnected by two routers. The number of hosts for the subnets are indicated in the figure. Suppose static IP addresses will be assigned to these hosts and the router interfaces from IP address block 4.1.0.0/16.
   a. (10 pts) Identify the subnets in the network.
   b. (25 pts) Assign network addresses to the subnets found in part (a) in the form a.b.c.d/m such that each subnet has enough number of IP addresses and the largest possible value is assigned to m.



3. Consider the following network,
   a. (20 pts) Use Dijkstra's algorithm to compute the shortest path from node "A" to all other network nodes.
   b. (10 pts) Give the forwarding table in node "A" and indicate <destination, cost, next hop> for each destination.