Q1:

(a) What is the maximum number of connections that can be concurrently admitted in the network?

20 + 19 + 15 + 16 = 70

(b) Suppose that these maximum number of connections are all ongoing. What happens when another call connection request arrives to the network, will it be accepted? Explain your answer.

It will not be accepted as all the circuits are occupied. But, on the special case it does have a memory buffer It can accept even though its full.

(c) Suppose that every connection requires 2 consecutive hops, and calls are connected clockwise. For example, a connection can go from A to B, from B to C, from C to D, and from D to A. With these constraints, what is the is the maximum number of connections that can be ongoing in the network at any one time?

19 (A – B – C) + 15 (C – D – A) + 1 (D – A – B)= 35

Q2:

Two hosts, A and B, are separated with a distance of $300\ km$. Host A sends a packet of size $3\ Mbit$ to Host B via a link of rate $100\ Mbps$. Suppose that the propagation speed along the link is 3×10^8 meters/sec.

(a) Calculate the propagation delay, d_{prop}.

(300*10^3) / (3*10^8) = 0.001 sec

(b) Determine the transmission time of the packet, d_{trans}.

3 / 100 = 0.03 sec

(c) Calculate the end-to-end delay, ignoring processing and queuing delays.

0.001 + 0.03 = 0.031 sec

Q3: As shown in the figure below, a server sends packets to two different clients via a router. Assume that $R_1 = 250\ Mbps$, $R_2 = R_3 = 50\ Mbps$, and each packet is 5 Mbit in size. The propagation delay is 2 msec per link.

(a) How long does it take the server to transmit a packet into its link?

5/250 = 0.02 sec

(b) When the sender begins sending a packet to one of the two clients, what is the end-to-end delay until it is received by the client (the answer is the same for both clients)? Consider store-and-forward packet transmission with zero queueing delay and processing delay.

2*0.02 sec (R1) + 0.1 sec (R2) + 0.002 sec (prop delay) = 0.124 sec

(c) Assume that the link with capacity R_1 is fairly shared between the two sessions. What is the maximum end-to-end throughput achieved by each session, assuming both sessions are sending at the maximum rate possible?

50Mbps

(d) Assume that the link with capacity R_1 is fairly shared between the two sessions, and $R_2 = 200\ Mbps$ and $R_3 = 70\ Mbps$. What is the maximum end-to-end throughput achieved by each session, assuming the sender is sending to receivers at the maximum rate possible?

125 Mbps for R2 (as R1 is fairly split 250/2 = 125) and 70 Mbps for R3