In the name of beauty

1st problem set of ComNet course

Q1)

Determine the following statements as true or false with enough reasons.

a- Transmission delay is defined as the time elapsed when a single bit physically traverses a link.

b- Packet Switching is practically more complicated than Circuit Switching while being more suitable to real-time applications.

c- In a host-to-host transmission, packets only traverse a collection of links in the network.

d- With traffic intensity being close to 1, the queuing delay of the packets tends to zero.

e- Link-layer switches are typically capable of processing the packets up to the layer 3.

f- SMTP and FTP are examples of layer 1 protocols while TCP is a transport layer protocol.

Q2)

What is the difference between **Virus** and **Worm**?

Q3)

Consider the following network in which node A wants to send packets to node B through a router and two links: Assume the transmission

rate of the links 1 and 2 to be 100Mbits/sec and 50Mbits/sec, respectively and both of the links be 10km long. The speed of light is 2×10^8m/s in the links.

a- What is the end-to-end propagation delay?

b- Assume node A wishes to transmit 4 consecutive, 12.5Kbytes packets, each of which being sent at a single 1ms time slot, that is, packet 1 is sent in the first time slot, packet 2 is sent in the second time slot and so on. If the router does not impose processing delay on packets, how much buffer capacity would it need for storing incoming packets in the 4th time slot due to the queuing delay of the previously received packets?

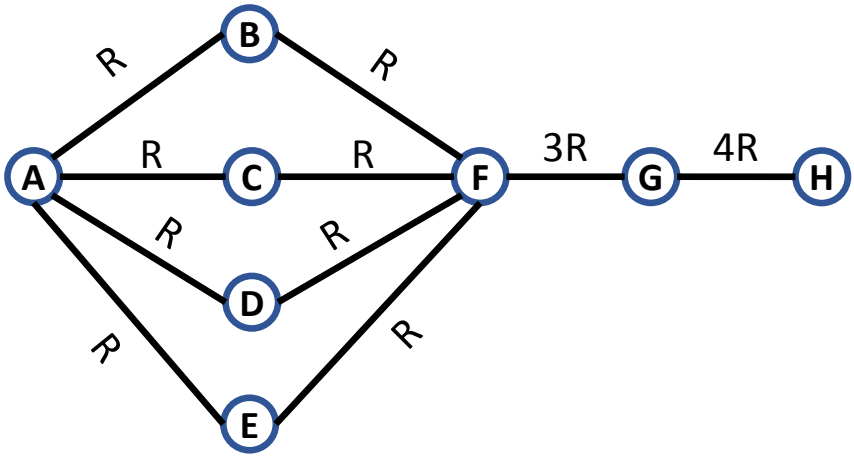
c- Is there any bottleneck link and if so, which one and why?

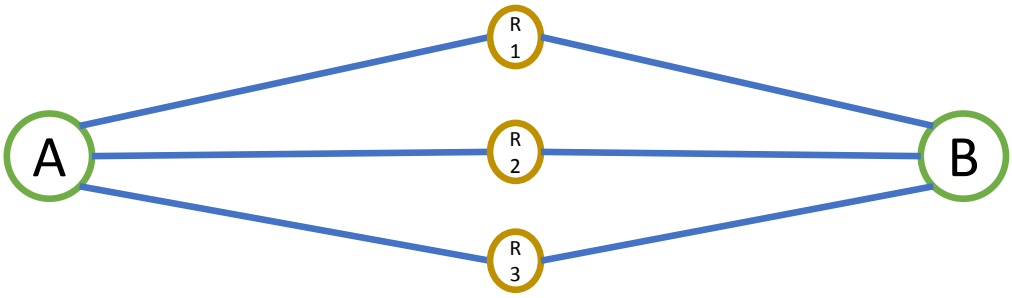
Q4) In the following network topology, each link is vulnerable to be brought down with a probability of p independent of the other ones. What is the probability that there exists a path between nodes A and H with a throughput of $2R$? (The total throughput of a path is defined as the maximum rate at which bits can be sent over the path)

Q5)

In the following network sketch, node A can send packets arbitrarily over each of the three paths to routers R1, R2 and R3 and node B can receive packets arbitrarily too. If each link fails to transmit data with a probability of p independent of the other ones.

a- What is the probability that a packet initiated at node A, finally





reaches its destination at node B?

b- If each link has a throughput of R, what would be the effective throughput between nodes A and B? (i.e. the throughput that node A actually exploits and senses in transmission to node B; you need to do some probability calculations to obtain the answer!)