Name - Sibasish Rout

Entry number- 2020CS10386

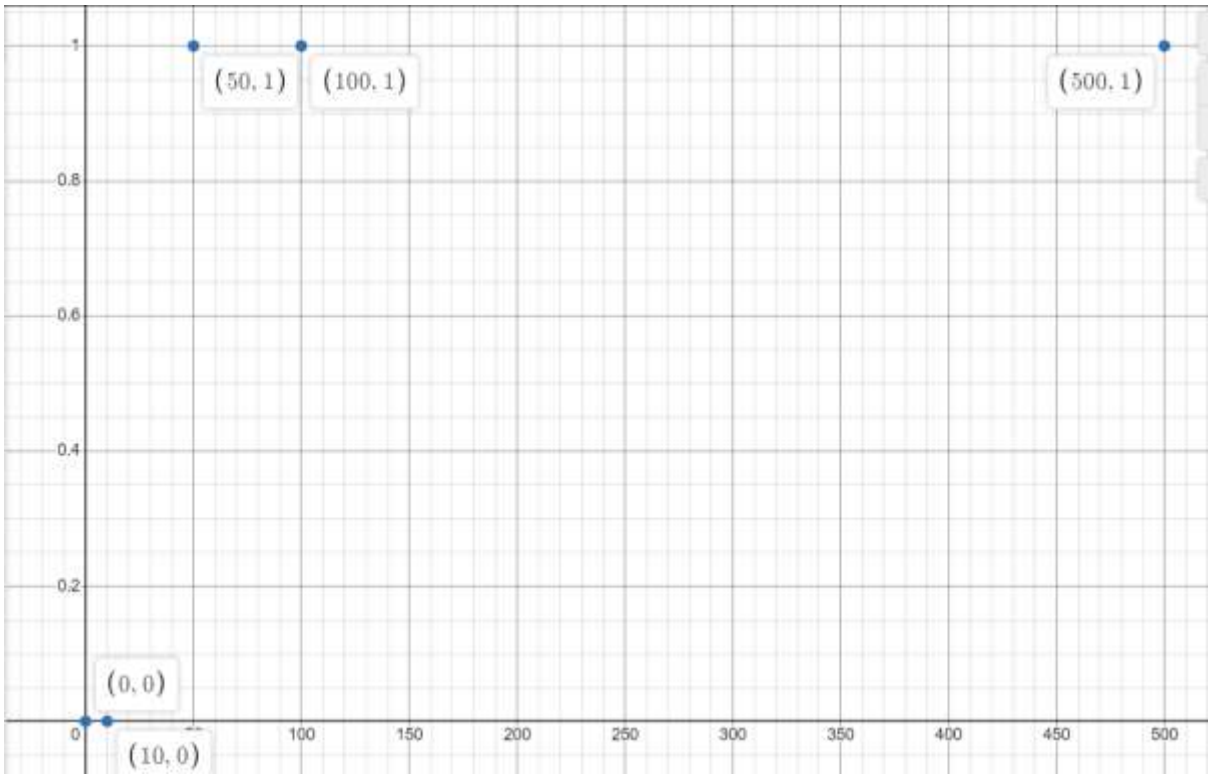
Part B

Task i

Question a

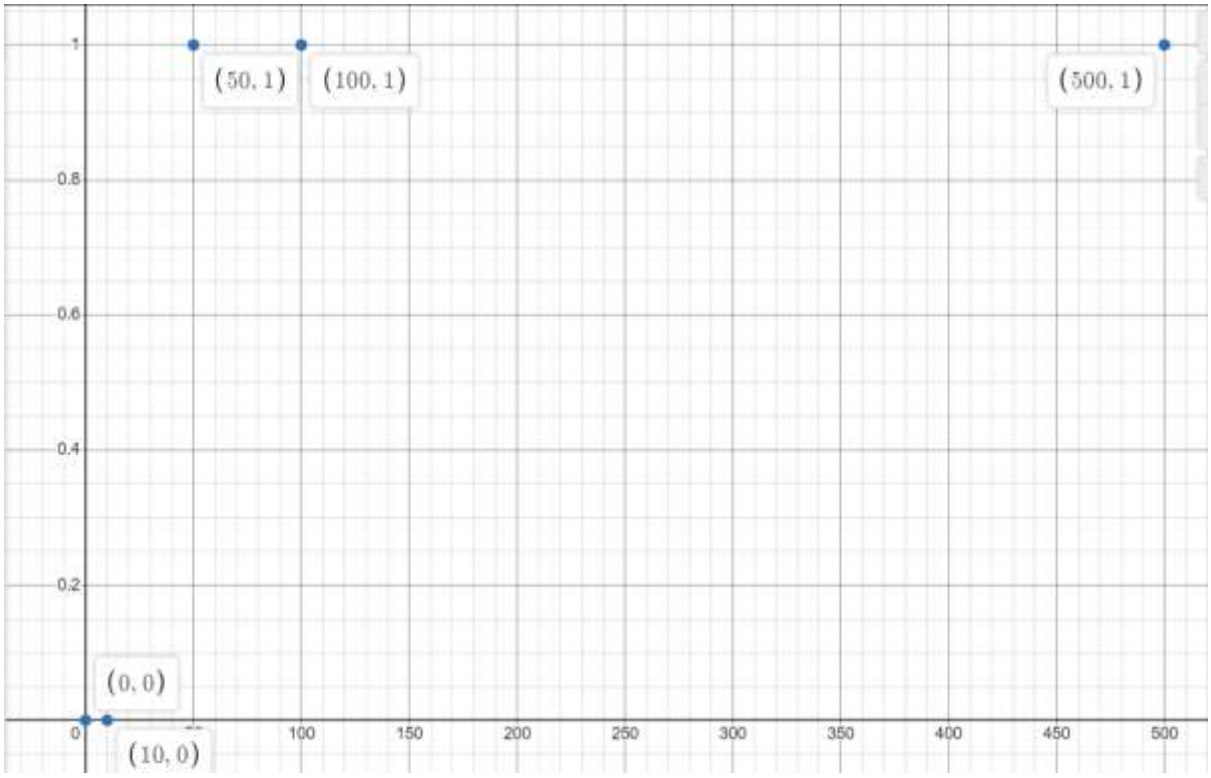
For CSMA delay =100ms

Time(in s)	Value
0	0
10	0
50	1
100	1
500	1



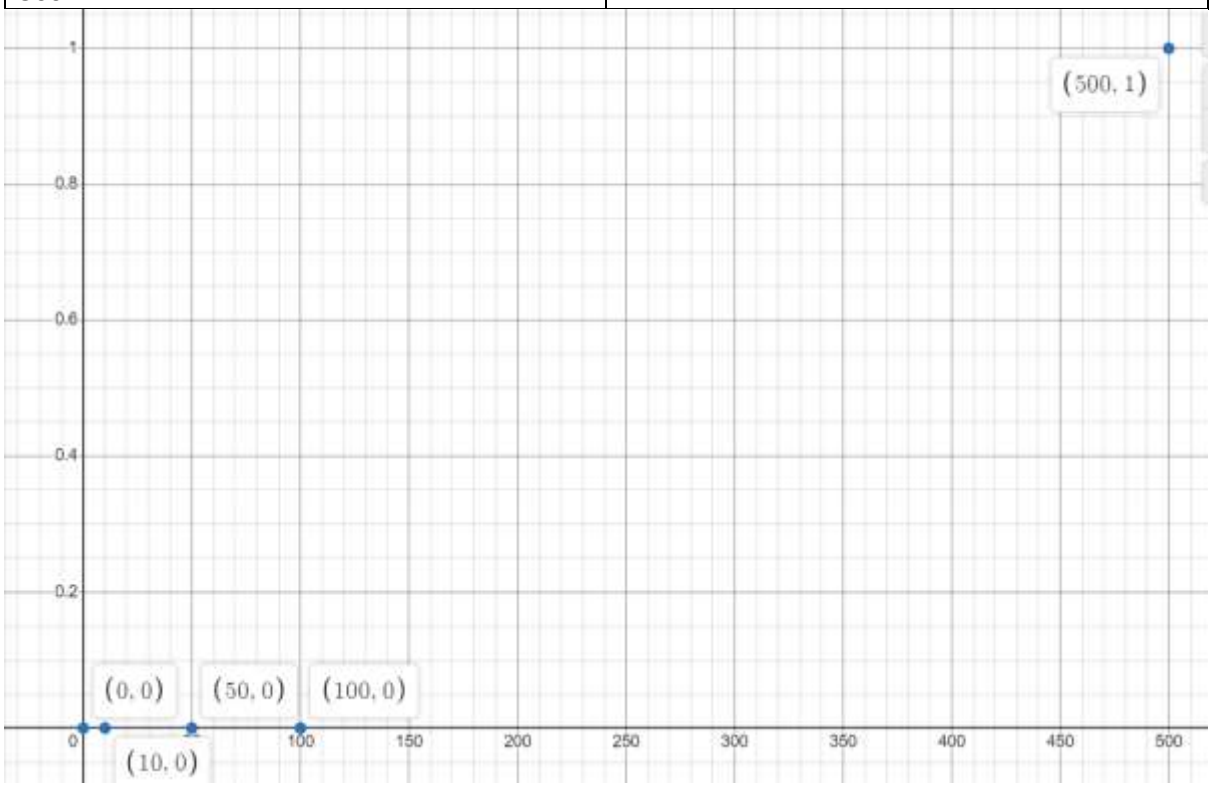
CSMA delay =1000ms

Time(in s)	Value
0	0
10	0
50	1
100	1
500	1



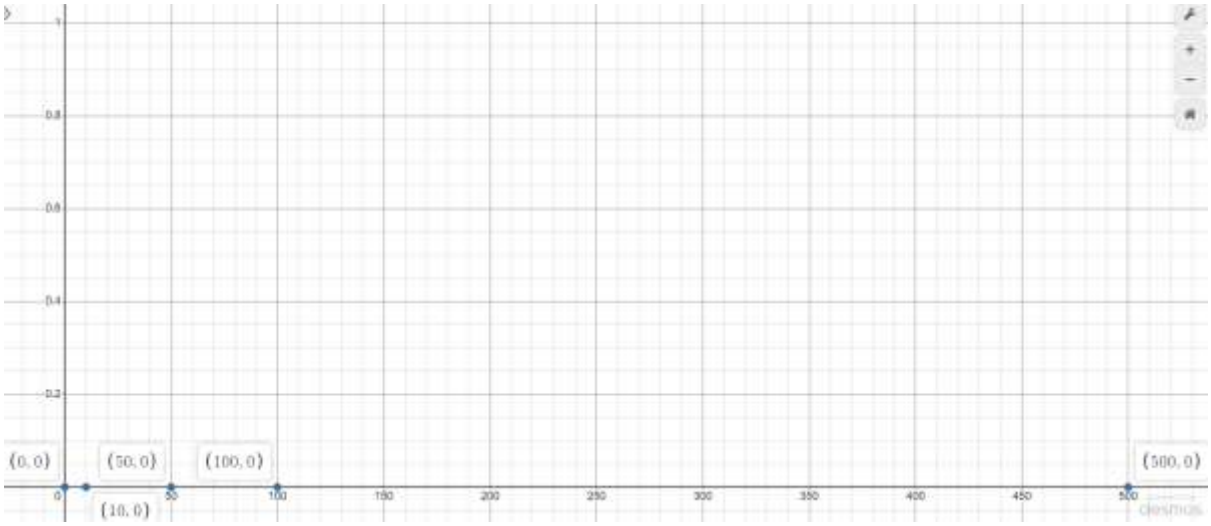
CSMA delay =20000ms

Time(in s)	Value
0	0
10	0
50	0
100	0
500	1



For CSMA delay =80000ms

Time(in s)	Value
0	0
10	0
50	0
100	0
500	1



Question b

Here we observe that as the delay in the CSMA channel increases the routing tables take more and more time to converge. This is due to the fact that the routing protocol we have used (i.e. RIP) is based distance vector routing protocol. In distance vector the router learns about the distances/reachability of its neighbours, adjusts its own routing table accordingly and then sends its reachability information to all its neighbours. Thus, this protocol involves many reachability information transfers between the routers before the routing protocol converges. When we increase the channel delay these transmissions take a larger time. Hence, we observe that time taken for the routing tables to converge increases as the channel delay increases.

Task ii

Question a

At t=121 s

For R1

```
Node: 2, Time: +121.0s, Local time: +121.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 2, Time: +121.0s, Local time: +121.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.0.0        0.0.0.0         255.255.255.0   U     1      -      -   1

```

For R2

```
Node: 3, Time: +121.0s, Local time: +121.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 3, Time: +121.0s, Local time: +121.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.0.0        10.0.3.2        255.255.255.0   UGS   3      -      -   2
10.0.4.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.2.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.1.0        10.0.3.2        255.255.255.0   UGS   16     -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
```

For R3

```
Node: 4, Time: +121.0s, Local time: +121.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 4, Time: +121.0s, Local time: +121.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
10.0.4.0        0.0.0.0         255.255.255.0   U     1      -      -   3
```

At t=180 s

For R1

```
Node: 2, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 2, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.0.0        0.0.0.0         255.255.255.0   U     1      -      -   1
```

For R2

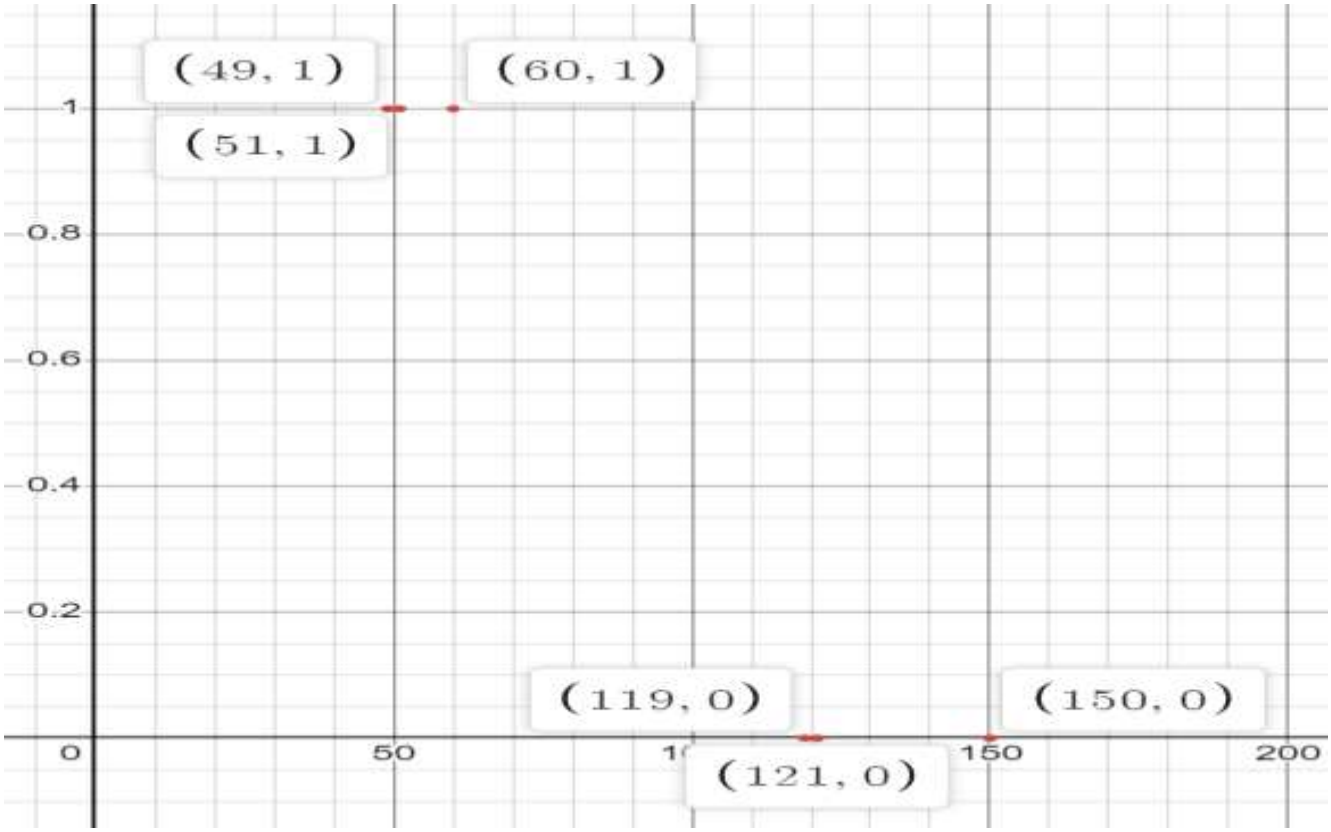
```
Node: 3, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 3, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.4.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.1.0        10.0.3.2        255.255.255.0   UGS   16     -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
```

For R3

```
Node: 4, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 4, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
10.0.4.0        0.0.0.0         255.255.255.0   U     1      -      -   3
```

Question b

Time(in s)	Value
49	1
51	1
60	1
119	1
121	0
150	0



Question c

At t=51 seconds the destination is reachable from source this is because due to small channel delays the routing table converge very fast and even though we break down the R1-R2 link at 50s the R1-R3 link still exists and hence we can still reach the destination by routing the packets to R3. Due to very less channel delay all this is information almost immediately updated in the routing tables.

At t=119s the situation is not much different from t=51s and the destination can still be reached by routing packets from R1 to R3.

At t=120s the link from R1-R3 is also taken down and hence there is no way we can reach the destination from source now in our topology. Due to very less channel delay all this is information almost immediately updated in the routing tables. Thus at t=121s we cannot reach the destination from the source as there is no way R1 can route packets to destination.

Task iii

Question a

At t=70s

For R1

```
Node: 2, Time: +70.0s, Local time: +70.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 2, Time: +70.0s, Local time: +70.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.0.0        0.0.0.0         255.255.255.0   U     1      -      -   1
```

For R2

```
  Node: 3, Time: +70.0s, Local time: +70.0s, Ipv4ListRouting table
    Priority: 0 Protocol: ns3::Rip
  Node: 3, Time: +70.0s, Local time: +70.0s, IPv4 RIP table
  Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
  10.0.4.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
  10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
```

For R3

```
  Node: 4, Time: +70.0s, Local time: +70.0s, Ipv4ListRouting table
    Priority: 0 Protocol: ns3::Rip
  Node: 4, Time: +70.0s, Local time: +70.0s, IPv4 RIP table
  Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
  10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
  10.0.4.0        0.0.0.0         255.255.255.0   U     1      -      -   3
```

At t=180s

For R1

```
  Node: 2, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
    Priority: 0 Protocol: ns3::Rip
  Node: 2, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
  Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
  10.0.4.0        10.0.2.2        255.255.255.0   UGS   2      -      -   3
  10.0.3.0        10.0.1.2        255.255.255.0   UGS   2      -      -   2
  10.0.0.0        0.0.0.0         255.255.255.0   U     1      -      -   1
  10.0.1.0        10.0.2.2        255.255.255.0   UGS   3      -      -   3
  10.0.2.0        10.0.1.2        255.255.255.0   UGS   3      -      -   2
  10.0.1.0        0.0.0.0         255.255.255.0   U     1      -      -   2
  10.0.2.0        0.0.0.0         255.255.255.0   U     1      -      -   3
```

For R2

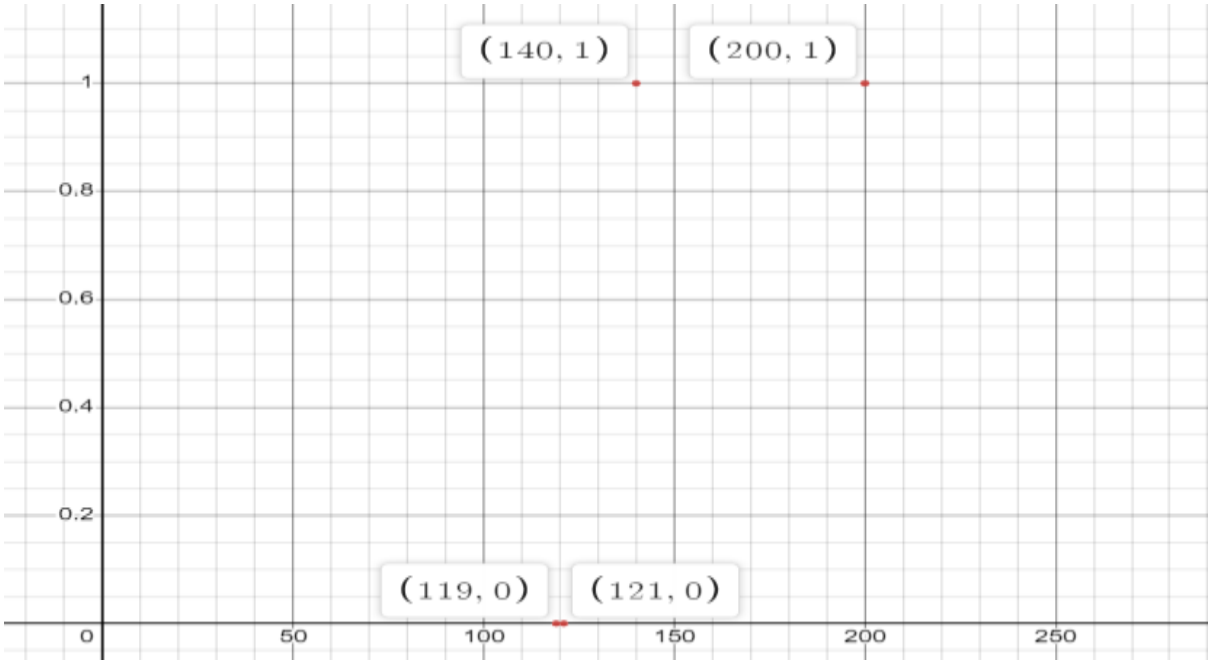
```
Node: 3, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 3, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.0.0        10.0.1.1        255.255.255.0   UGS   2      -      -   1
10.0.4.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.2.0        10.0.3.2        255.255.255.0   UGS   2      -      -   2
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
10.0.1.0        0.0.0.0         255.255.255.0   U     1      -      -   1
```

For R3

```
Node: 4, Time: +180.0s, Local time: +180.0s, Ipv4ListRouting table
  Priority: 0 Protocol: ns3::Rip
Node: 4, Time: +180.0s, Local time: +180.0s, IPv4 RIP table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.1.0        10.0.3.1        255.255.255.0   UGS   2      -      -   2
10.0.0.0        10.0.2.1        255.255.255.0   UGS   2      -      -   1
10.0.3.0        0.0.0.0         255.255.255.0   U     1      -      -   2
10.0.4.0        0.0.0.0         255.255.255.0   U     1      -      -   3
10.0.2.0        0.0.0.0         255.255.255.0   U     1      -      -   1
```

Question b

Time(in s)	Value
119	0
121	0
140	1
200	1



Files submitted: -

Second.cc-Topology file

The graphs are made by observing values in ROUTER1.cwnd, ROUTER2.cwnd and ROUTER3.cwnd and then using the Desmos calculator.