There are three routers A, B, and C, each of which is connected to two hosts. Also, the three routers themselves are connected to each other with IP addresses 20.10.100.0/24. You need to design subnets (LAN A, B, and C) that connect the two hosts to each router.

The IP address space is 20.10.172.0—20.10.172.255.
LAN A has at least 50 hosts
LAN B has at least 75 hosts
LAN C has at least 20 hosts.

LAN A:
Subnet Mask: 20.10.172.0/26
Network Address: 20.10.172.0
Smallest IP address: 20.10.172.0
Highest IP address: 20.10.172.63

LAN B:
Subnet Mask: 20.10.172.64/25
Network Address: 20.10.172.64
Smallest IP address: 20.10.172.64
Highest IP address: 20.10.172.192

LAN C:
Subnet Mask: 20.10.172.193/27
Network Address: 20.10.172.193
Smallest IP address: 20.10.172.193
Highest IP address: 20.10.172.225

TASK 2:

Reachability Information:

```
mininet@mininet-vm:~$ sudo python3 subnet.py
*** Adding controller
*** Adding hosts
*** Adding switch
*** Creating links
*** Starting network
*** Configuring hosts
h1 h2 h3 h4 h5 h6
*** Starting controller
c0
*** Starting 3 switches
s1 s2 s3 ...
*** Waiting for switches to connect
s1 s2 s3
*** Running CLI
*** Starting CLI:
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 X X X X
h2 -> h1 X X X X
h3 -> X X h4 X X
h4 -> X X h3 X X
h5 -> X X X X h6
h6 -> X X X X h5
*** Results: 80% dropped (6/30 received)
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 X X X X
h2 -> h1 X X X X
h3 -> X X h4 X X
h4 -> X X h3 X X
h5 -> X X X X h6
h6 -> X X X X h5
*** Results: 80% dropped (6/30 received)
mininet> quit
*** Stopping network*** Stopping 1 controllers
c0
*** Stopping 6 links
......
*** Stopping 3 switches
s1 s2 s3
*** Stopping 6 hosts
h1 h2 h3 h4 h5 h6
*** Done
```

TASK 3:

Note: Those on switch 1 aka host 1 (h1) and host 2 (h2) cannot reach those on switch 2 aka host 3 (h3) and host 4 (h4) for some reason despite being configured correctly in the code.

PING command on each host:
Host 1

```
mininet> h1 ping -c 1 h2
PING 20.10.172.2 (20.10.172.2) 56(84) bytes of data.
64 bytes from 20.10.172.2: icmp_seq=1 ttl=64 time=0.598 ms

--- 20.10.172.2 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 12ms
rtt min/avg/max/mdev = 0.598/0.598/0.598/0.000 ms
mininet> h1 ping -c 1 h3
PING 20.10.172.65 (20.10.172.65) 56(84) bytes of data.

--- 20.10.172.65 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 2ms

mininet> h1 ping -c 1 h4
PING 20.10.172.66 (20.10.172.66) 56(84) bytes of data.

--- 20.10.172.66 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h1 ping -c 1 h5
PING 20.10.172.193 (20.10.172.193) 56(84) bytes of data.
64 bytes from 20.10.172.193: icmp_seq=1 ttl=63 time=59.0 ms

--- 20.10.172.193 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 19ms
rtt min/avg/max/mdev = 58.963/58.963/58.963/0.000 ms
mininet> h1 ping -c 1 h6
PING 20.10.172.194 (20.10.172.194) 56(84) bytes of data.
64 bytes from 20.10.172.194: icmp_seq=1 ttl=63 time=59.6 ms

--- 20.10.172.194 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 2ms
rtt min/avg/max/mdev = 59.569/59.569/59.569/0.000 ms
mininet> _
```

Host 2

```
mininet> h2 ping -c 1 h1
PING 20.10.172.1 (20.10.172.1) 56(84) bytes of data.
64 bytes from 20.10.172.1: icmp_seq=1 ttl=64 time=12.7 ms

--- 20.10.172.1 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 15ms
rtt min/avg/max/mdev = 12.668/12.668/12.668/0.000 ms
mininet> h2 ping -c 1 h3
PING 20.10.172.65 (20.10.172.65) 56(84) bytes of data.

--- 20.10.172.65 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 13ms

mininet> h2 ping -c 1 h4
PING 20.10.172.66 (20.10.172.66) 56(84) bytes of data.

--- 20.10.172.66 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

mininet> h2 ping -c 1 h5
PING 20.10.172.193 (20.10.172.193) 56(84) bytes of data.
64 bytes from 20.10.172.193: icmp_seq=1 ttl=63 time=67.2 ms

--- 20.10.172.193 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 67.167/67.167/67.167/0.000 ms
mininet> h2 ping -c 1 h6
PING 20.10.172.194 (20.10.172.194) 56(84) bytes of data.
64 bytes from 20.10.172.194: icmp_seq=1 ttl=63 time=59.5 ms

--- 20.10.172.194 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 59.540/59.540/59.540/0.000 ms
mininet> _
```

Host 3

```
mininet> h3 ping -c 1 h1
PING 20.10.172.1 (20.10.172.1) 56(84) bytes of data.
From 20.10.172.65 icmp_seq=1 Destination Host Unreachable

--- 20.10.172.1 ping statistics ---
1 packets transmitted, 0 received, +1 errors, 100% packet loss, time 4ms

mininet> h3 ping -c 1 h2
PING 20.10.172.2 (20.10.172.2) 56(84) bytes of data.
From 20.10.172.65 icmp_seq=1 Destination Host Unreachable

--- 20.10.172.2 ping statistics ---
1 packets transmitted, 0 received, +1 errors, 100% packet loss, time 7ms

mininet> h3 ping -c 1 h4
PING 20.10.172.66 (20.10.172.66) 56(84) bytes of data.
64 bytes from 20.10.172.66: icmp_seq=1 ttl=64 time=37.1 ms

--- 20.10.172.66 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 4ms
rtt min/avg/max/mdev = 37.114/37.114/37.114/0.000 ms
mininet> h3 ping -c 1 h5
PING 20.10.172.193 (20.10.172.193) 56(84) bytes of data.
64 bytes from 20.10.172.193: icmp_seq=1 ttl=63 time=35.3 ms

--- 20.10.172.193 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 35.315/35.315/35.315/0.000 ms
mininet> h3 ping -c 1 h6
PING 20.10.172.194 (20.10.172.194) 56(84) bytes of data.
64 bytes from 20.10.172.194: icmp_seq=1 ttl=63 time=72.2 ms

--- 20.10.172.194 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 20ms
rtt min/avg/max/mdev = 72.158/72.158/72.158/0.000 ms
mininet> _
```

Host 4

```
mininet> h4 ping -c 1 h1
PING 20.10.172.1 (20.10.172.1) 56(84) bytes of data.
From 20.10.172.66 icmp_seq=1 Destination Host Unreachable

--- 20.10.172.1 ping statistics ---
1 packets transmitted, 0 received, +1 errors, 100% packet loss, time 5ms

mininet> h4 ping -c 1 h2
PING 20.10.172.2 (20.10.172.2) 56(84) bytes of data.
From 20.10.172.66 icmp_seq=1 Destination Host Unreachable

--- 20.10.172.2 ping statistics ---
1 packets transmitted, 0 received, +1 errors, 100% packet loss, time 0ms

mininet> h4 ping -c 1 h3
PING 20.10.172.65 (20.10.172.65) 56(84) bytes of data.
64 bytes from 20.10.172.65: icmp_seq=1 ttl=64 time=23.9 ms

--- 20.10.172.65 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 22ms
rtt min/avg/max/mdev = 23.912/23.912/23.912/0.000 ms
mininet> h4 ping -c 1 h4
PING 20.10.172.66 (20.10.172.66) 56(84) bytes of data.
64 bytes from 20.10.172.66: icmp_seq=1 ttl=64 time=0.112 ms

--- 20.10.172.66 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 9ms
rtt min/avg/max/mdev = 0.112/0.112/0.112/0.000 ms
mininet> h4 ping -c 1 h5
PING 20.10.172.193 (20.10.172.193) 56(84) bytes of data.
64 bytes from 20.10.172.193: icmp_seq=1 ttl=63 time=69.5 ms

--- 20.10.172.193 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 4ms
rtt min/avg/max/mdev = 69.510/69.510/69.510/0.000 ms
mininet> h4 ping -c 1 h6
PING 20.10.172.194 (20.10.172.194) 56(84) bytes of data.
64 bytes from 20.10.172.194: icmp_seq=1 ttl=63 time=62.3 ms

--- 20.10.172.194 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 62.257/62.257/62.257/0.000 ms
mininet> _
```

Host 5

```
mininet> h5 ping -c 1 h1
PING 20.10.172.1 (20.10.172.1) 56(84) bytes of data.
64 bytes from 20.10.172.1: icmp_seq=1 ttl=63 time=55.7 ms

--- 20.10.172.1 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 4ms
rtt min/avg/max/mdev = 55.727/55.727/55.727/0.000 ms
mininet> h5 ping -c 1 h2
PING 20.10.172.2 (20.10.172.2) 56(84) bytes of data.
64 bytes from 20.10.172.2: icmp_seq=1 ttl=63 time=49.4 ms

--- 20.10.172.2 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 49.440/49.440/49.440/0.000 ms
mininet> h5 ping -c 1 h3
PING 20.10.172.65 (20.10.172.65) 56(84) bytes of data.
64 bytes from 20.10.172.65: icmp_seq=1 ttl=63 time=30.8 ms

--- 20.10.172.65 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 30.841/30.841/30.841/0.000 ms
mininet> h5 ping -c 1 h4
PING 20.10.172.66 (20.10.172.66) 56(84) bytes of data.
64 bytes from 20.10.172.66: icmp_seq=1 ttl=63 time=58.1 ms

--- 20.10.172.66 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 58.093/58.093/58.093/0.000 ms
mininet> h5 ping -c 1 h5
PING 20.10.172.193 (20.10.172.193) 56(84) bytes of data.
64 bytes from 20.10.172.193: icmp_seq=1 ttl=64 time=4.45 ms

--- 20.10.172.193 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 1ms
rtt min/avg/max/mdev = 4.449/4.449/4.449/0.000 ms
mininet> h5 ping -c 1 h6
PING 20.10.172.194 (20.10.172.194) 56(84) bytes of data.
64 bytes from 20.10.172.194: icmp_seq=1 ttl=64 time=27.0 ms

--- 20.10.172.194 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 3ms
rtt min/avg/max/mdev = 27.029/27.029/27.029/0.000 ms
mininet>
```

Host 6

```
mininet> h6 ping -c 1 h1
PING 20.10.172.1 (20.10.172.1) 56(84) bytes of data.
64 bytes from 20.10.172.1: icmp_seq=1 ttl=63 time=56.8 ms

--- 20.10.172.1 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 56.830/56.830/56.830/0.000 ms
mininet> h6 ping -c 1 h2
PING 20.10.172.2 (20.10.172.2) 56(84) bytes of data.
64 bytes from 20.10.172.2: icmp_seq=1 ttl=63 time=44.1 ms

--- 20.10.172.2 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 2ms
rtt min/avg/max/mdev = 44.060/44.060/44.060/0.000 ms
mininet> h6 ping -c 1 h3
PING 20.10.172.65 (20.10.172.65) 56(84) bytes of data.
64 bytes from 20.10.172.65: icmp_seq=1 ttl=63 time=49.9 ms

--- 20.10.172.65 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 1ms
rtt min/avg/max/mdev = 49.882/49.882/49.882/0.000 ms
mininet> h6 ping -c 1 h4
PING 20.10.172.66 (20.10.172.66) 56(84) bytes of data.
64 bytes from 20.10.172.66: icmp_seq=1 ttl=63 time=51.7 ms

--- 20.10.172.66 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 17ms
rtt min/avg/max/mdev = 51.658/51.658/51.658/0.000 ms
mininet> h6 ping -c 1 h5
PING 20.10.172.193 (20.10.172.193) 56(84) bytes of data.
64 bytes from 20.10.172.193: icmp_seq=1 ttl=64 time=34.0 ms

--- 20.10.172.193 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 5ms
rtt min/avg/max/mdev = 34.048/34.048/34.048/0.000 ms
mininet> h6 ping -c 1 h6
PING 20.10.172.194 (20.10.172.194) 56(84) bytes of data.
64 bytes from 20.10.172.194: icmp_seq=1 ttl=64 time=0.321 ms

--- 20.10.172.194 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 3ms
rtt min/avg/max/mdev = 0.321/0.321/0.321/0.000 ms
mininet>
```