Question 2)

a)

curl 40.1.1.1/24

ping 40.1.1.1

```
⊗ vm_1@VM-1:~/CN/2022497-Assignment3$ curl 40.1.1.1/24
  curl: (7) Failed to connect to 40.1.1.1 port 80 after 0 ms: Connection refused
● vm_1@VM-1:~/CN/2022497-Assignment3$ ping 40.1.1.1
  PING 40.1.1.1 (40.1.1.1) 56(84) bytes of data.
  64 bytes from 40.1.1.1: icmp_seq=1 ttl=64 time=21.8 ms
  64 bytes from 40.1.1.1: icmp_seq=2 ttl=64 time=0.066 ms
  64 bytes from 40.1.1.1: icmp_seq=3 ttl=64 time=0.067 ms
  ^C
  --- 40.1.1.1 ping statistics ---
  3 packets transmitted, 3 received, 0% packet loss, time 2066ms
  rtt min/avg/max/mdev = 0.066/7.314/21.809/10.249 ms
○ vm_1@VM-1:~/CN/2022497-Assignment3$ █
```

b)

ping -c 40.1.1.1

nc -zv 40.1.1.1 80

```
● vm_1@VM-1:~/CN/2022497-Assignment3$ ping -c 4 40.1.1.1
  PING 40.1.1.1 (40.1.1.1) 56(84) bytes of data.
  64 bytes from 40.1.1.1: icmp_seq=1 ttl=64 time=0.130 ms
  64 bytes from 40.1.1.1: icmp_seq=2 ttl=64 time=0.054 ms
  64 bytes from 40.1.1.1: icmp_seq=3 ttl=64 time=0.127 ms
  64 bytes from 40.1.1.1: icmp_seq=4 ttl=64 time=0.050 ms

  --- 40.1.1.1 ping statistics ---
  4 packets transmitted, 4 received, 0% packet loss, time 3066ms
  rtt min/avg/max/mdev = 0.050/0.090/0.130/0.038 ms
⊗ vm_1@VM-1:~/CN/2022497-Assignment3$ nc -zv 40.1.1.1 80
  nc: connect to 40.1.1.1 port 80 (tcp) failed: Connection refused
○ vm_1@VM-1:~/CN/2022497-Assignment3$ █
```

Question 3)

a)

For TCP-> iperf -c 40.1.1.3

```
vm_1@VM-1:~/CN/2022497-Assignment3$ iperf -c 40.1.1.3
------------------------------------------------------------
Client connecting to 40.1.1.3, TCP port 5001
TCP window size: 2.50 MByte (default)
------------------------------------------------------------
[  1] local 40.1.1.1 port 36732 connected with 40.1.1.3 port 5001
[ ID] Interval       Transfer     Bandwidth
[  1] 0.0000-10.0011 sec  7.98 GBytes  6.85 Gbits/sec
vm_1@VM-1:~/CN/2022497-Assignment3$
```

For UDP->iperf -c 40.1.1.3 -u -p 6003

```
vm_1@VM-1:~/CN/2022497-Assignment3$ iperf -c 40.1.1.3 -u -p 6003
------------------------------------------------------------
Client connecting to 40.1.1.3, UDP port 6003
Sending 1470 byte datagrams, IPG target: 11215.21 us (kalman adjust)
UDP buffer size:  208 KByte (default)
------------------------------------------------------------
[  1] local 40.1.1.1 port 40578 connected with 40.1.1.3 port 6003
[ ID] Interval       Transfer     Bandwidth
[  1] 0.0000-10.0174 sec  1.25 MBytes  1.05 Mbits/sec
[  1] Sent 896 datagrams
[  3] WARNING: did not receive ack of last datagram after 10 tries.
vm_1@VM-1:~/CN/2022497-Assignment3$
```

b)

 i)ping 40.1.1.1 -c 10

```
vm_1@VM-1:~/CN/2022497-Assignment3$ ping 40.1.1.1 -c 10
PING 40.1.1.1 (40.1.1.1) 56(84) bytes of data.
64 bytes from 40.1.1.1: icmp_seq=1 ttl=64 time=0.099 ms
64 bytes from 40.1.1.1: icmp_seq=2 ttl=64 time=0.061 ms
64 bytes from 40.1.1.1: icmp_seq=3 ttl=64 time=0.058 ms
64 bytes from 40.1.1.1: icmp_seq=4 ttl=64 time=0.134 ms
64 bytes from 40.1.1.1: icmp_seq=5 ttl=64 time=0.106 ms
64 bytes from 40.1.1.1: icmp_seq=6 ttl=64 time=0.087 ms
64 bytes from 40.1.1.1: icmp_seq=7 ttl=64 time=0.074 ms
64 bytes from 40.1.1.1: icmp_seq=8 ttl=64 time=0.101 ms
64 bytes from 40.1.1.1: icmp_seq=9 ttl=64 time=0.070 ms
64 bytes from 40.1.1.1: icmp_seq=10 ttl=64 time=0.063 ms

--- 40.1.1.1 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9228ms
rtt min/avg/max/mdev = 0.058/0.085/0.134/0.023 ms
vm_1@VM-1:~/CN/2022497-Assignment3$
```

ii)ping 40.1.1.3 -c 10

```
vm_1@VM-1:~/CN/2022497-Assignment3$ ping 40.1.1.3 -c 10
PING 40.1.1.3 (40.1.1.3) 56(84) bytes of data.
64 bytes from 40.1.1.3: icmp_seq=1 ttl=64 time=0.058 ms
64 bytes from 40.1.1.3: icmp_seq=2 ttl=64 time=0.068 ms
64 bytes from 40.1.1.3: icmp_seq=3 ttl=64 time=0.074 ms
64 bytes from 40.1.1.3: icmp_seq=4 ttl=64 time=0.078 ms
64 bytes from 40.1.1.3: icmp_seq=5 ttl=64 time=0.063 ms
64 bytes from 40.1.1.3: icmp_seq=6 ttl=64 time=0.064 ms
64 bytes from 40.1.1.3: icmp_seq=7 ttl=64 time=0.056 ms
64 bytes from 40.1.1.3: icmp_seq=8 ttl=64 time=0.079 ms
64 bytes from 40.1.1.3: icmp_seq=9 ttl=64 time=0.485 ms
64 bytes from 40.1.1.3: icmp_seq=10 ttl=64 time=0.066 ms

--- 40.1.1.3 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9227ms
rtt min/avg/max/mdev = 0.056/0.109/0.485/0.125 ms
vm_1@VM-1:~/CN/2022497-Assignment3$
```

iii)

ping 40.1.1.1 -c 10

Minimum RTT   0.058 ms

Average RTT   0.085 ms

Maximum RTT   0.134 ms

ping 40.1.1.3 -c 10

Minimum RTT   0.056 ms

Average RTT   0.109 ms

Maximum RTT   0.485 ms

Average and Maximum latency of ping 40.1.1.3 is higher than ping 40.1.1.1 due to the possible reasons like there can multiple network path between client and server which result in increasing in number of hops . Server 40.1.1.3 might be under higher computational load result in increased in latency.

Question 4)ping 40.1.1.3

```
vm_1@VM-1:~/CN/2022497-Assignment3$ ping 40.1.1.3
PING 40.1.1.3 (40.1.1.3) 56(84) bytes of data.
64 bytes from 40.1.1.3: icmp_seq=1 ttl=64 time=2.69 ms
64 bytes from 40.1.1.3: icmp_seq=2 ttl=64 time=0.081 ms
64 bytes from 40.1.1.3: icmp_seq=3 ttl=64 time=0.076 ms
64 bytes from 40.1.1.3: icmp_seq=4 ttl=64 time=0.084 ms
64 bytes from 40.1.1.3: icmp_seq=5 ttl=64 time=0.067 ms
64 bytes from 40.1.1.3: icmp_seq=6 ttl=64 time=0.116 ms
64 bytes from 40.1.1.3: icmp_seq=7 ttl=64 time=0.095 ms
64 bytes from 40.1.1.3: icmp_seq=8 ttl=64 time=0.064 ms
64 bytes from 40.1.1.3: icmp_seq=9 ttl=64 time=0.069 ms
^C
--- 40.1.1.3 ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8167ms
rtt min/avg/max/mdev = 0.064/0.370/2.685/0.818 ms
vm_1@VM-1:~/CN/2022497-Assignment3$
```

Question 5)

ping -c 10 40.1.1.1

```
vm_1@VM-1:~/CN/2022497-Assignment3$ ping -c 10 40.1.1.1
PING 40.1.1.1 (40.1.1.1) 56(84) bytes of data.
64 bytes from 40.1.1.1: icmp_seq=1 ttl=64 time=0.129 ms
64 bytes from 40.1.1.1: icmp_seq=2 ttl=64 time=0.069 ms
64 bytes from 40.1.1.1: icmp_seq=3 ttl=64 time=0.069 ms
64 bytes from 40.1.1.1: icmp_seq=4 ttl=64 time=0.096 ms
64 bytes from 40.1.1.1: icmp_seq=5 ttl=64 time=0.076 ms
64 bytes from 40.1.1.1: icmp_seq=6 ttl=64 time=0.064 ms
64 bytes from 40.1.1.1: icmp_seq=7 ttl=64 time=0.077 ms
64 bytes from 40.1.1.1: icmp_seq=8 ttl=64 time=0.062 ms
64 bytes from 40.1.1.1: icmp_seq=9 ttl=64 time=0.065 ms
64 bytes from 40.1.1.1: icmp_seq=10 ttl=64 time=0.065 ms

--- 40.1.1.1 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9230ms
rtt min/avg/max/mdev = 0.062/0.077/0.129/0.019 ms
vm_1@VM-1:~/CN/2022497-Assignment3$
```

ping -c 10 40.1.1.3

```
vm_1@VM-1:~/CN/2022497-Assignment3$ ping -c 10 40.1.1.3
PING 40.1.1.3 (40.1.1.3) 56(84) bytes of data.
64 bytes from 40.1.1.3: icmp_seq=1 ttl=64 time=29.2 ms
64 bytes from 40.1.1.3: icmp_seq=2 ttl=64 time=0.068 ms
64 bytes from 40.1.1.3: icmp_seq=3 ttl=64 time=0.583 ms
64 bytes from 40.1.1.3: icmp_seq=4 ttl=64 time=0.066 ms
64 bytes from 40.1.1.3: icmp_seq=5 ttl=64 time=0.076 ms
64 bytes from 40.1.1.3: icmp_seq=6 ttl=64 time=0.067 ms
64 bytes from 40.1.1.3: icmp_seq=7 ttl=64 time=0.128 ms
64 bytes from 40.1.1.3: icmp_seq=8 ttl=64 time=0.066 ms
64 bytes from 40.1.1.3: icmp_seq=9 ttl=64 time=0.069 ms
64 bytes from 40.1.1.3: icmp_seq=10 ttl=64 time=0.065 ms

--- 40.1.1.3 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9182ms
rtt min/avg/max/mdev = 0.065/3.037/29.191/8.719 ms
vm_1@VM-1:~/CN/2022497-Assignment3$
```

Latency of ping 40.1.1.3 is much higher than latency ping 40.1.1.1