Question 1:

a.

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03/10/2022 14:56.58 /home/mobaxterm dig +nssearch root-servers.net
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.5.5.241 in 16 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.203.230.10 in 16 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.33.4.12 in 28 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 199.7.91.13 in 26 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 198.97.190.53 in 27 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.58.128.30 in 27 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 199.7.83.42 in 27 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 198.41.0.4 in 27 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.112.36.4 in 43 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 193.0.14.129 in 54 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 202.12.27.33 in 82 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 199.9.14.201 in 97 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.36.148.17 in 194 ms.


03/10/2022 14:57.06 /home/mobaxterm dig +nssearch edu-servers.net
SOA av4.nstld.com. nstld.verisign-grs.com. 1664756290 3600 900 1209600 86400 from server 192.42.178.30 in 17 ms.
SOA av4.nstld.com. nstld.verisign-grs.com. 1664756290 3600 900 1209600 86400 from server 192.82.134.30 in 30 ms.
SOA av4.nstld.com. nstld.verisign-grs.com. 1664756290 3600 900 1209600 86400 from server 192.82.133.30 in 54 ms.
SOA av4.nstld.com. nstld.verisign-grs.com. 1664756290 3600 900 1209600 86400 from server 192.42.177.30 in 78 ms.


03/10/2022 14:57.19 /home/mobaxterm dig +nssearch cse.uconn.edu
SOA msb-int.net.uconn.edu. abuse.uconn.edu. 2013056280 10800 3600 2419200 900 from server 67.218.95.47 in 15 ms.
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b.

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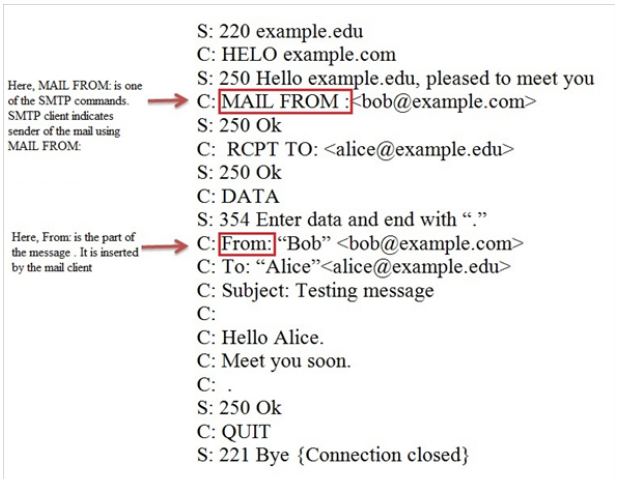
03/10/2022 16:13.14 /home/mobaxterm dig +nssearch google.com
SOA ns1.google.com. dns-admin.google.com. 478222697 900 900 1800 60 from server 216.239.36.10 in 36 ms.
SOA ns1.google.com. dns-admin.google.com. 478222697 900 900 1800 60 from server 216.239.38.10 in 36 ms.
SOA ns1.google.com. dns-admin.google.com. 478465650 900 900 1800 60 from server 216.239.32.10 in 36 ms.
SOA ns1.google.com. dns-admin.google.com. 478465650 900 900 1800 60 from server 216.239.34.10 in 51 ms.


03/10/2022 16:13.29 /home/mobaxterm dig +nssearch root-servers.net
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.36.148.17 in 42 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 198.41.0.4 in 59 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 199.7.91.13 in 59 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.203.230.10 in 58 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.5.5.241 in 58 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.33.4.12 in 72 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.58.128.30 in 72 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 192.112.36.4 in 91 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 199.7.83.42 in 88 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 198.97.190.53 in 87 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 193.0.14.129 in 104 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 202.12.27.33 in 120 ms.
SOA a.root-servers.net. nstld.verisign-grs.com. 2022092800 14400 7200 1209600 3600000 from server 199.9.14.201 in 134 ms.


03/10/2022 16:13.44 /home/mobaxterm dig +nssearch gtld-servers.net
SOA av4.nstld.com. nstld.verisign-grs.com. 1664756290 3600 900 1209600 86400 from server 192.82.134.30 in 35 ms.
SOA av4.nstld.com. nstld.verisign-grs.com. 1664756290 3600 900 1209600 86400 from server 192.42.178.30 in 35 ms.
SOA av4.nstld.com. nstld.verisign-grs.com. 1664756290 3600 900 1209600 86400 from server 192.42.177.30 in 50 ms.
SOA av4.nstld.com. nstld.verisign-grs.com. 1664756290 3600 900 1209600 86400 from server 192.82.133.30 in 81 ms.


03/10/2022 16:13.52 /home/mobaxterm dig +nssearch google.com
SOA ns1.google.com. dns-admin.google.com. 478465650 900 900 1800 60 from server 216.239.32.10 in 34 ms.
SOA ns1.google.com. dns-admin.google.com. 478222697 900 900 1800 60 from server 216.239.38.10 in 47 ms.
SOA ns1.google.com. dns-admin.google.com. 478222697 900 900 1800 60 from server 216.239.36.10 in 49 ms.
SOA ns1.google.com. dns-admin.google.com. 478465650 900 900 1800 60 from server 216.239.34.10 in 49 ms.
```

Question 2:
For “Mail From”: in SMTP is a message from the SMTP client that identifies the sender of the mail message to the SMTP server.
For just “From”: the mail message itself is NOT an SMTP message, but rather is just a line in the body of the mail message.
An example of the difference between the 2 would be this image:



Question 3:
a. False

Technically SMTP is “above” UDP as it is application layer compared to transport layer, but UDP would be needed for SMTP to be used, meaning UDP is above.

b. True

Post Office Protocol is a type of computer networking and internet protocol that extracts and retrieves email from a remote mail server for access by the host machine.

c. False

POP is an application layer protocol in the OSI model that provides end users the ability to fetch and receive email.

d. True

Original SMTP supports email addresses composed of ASCII characters only

e. True

Yes it allows agent to send mails to server

Question 4:

1. Run nslookup to obtain the IP address of a Web server in Asia. What is the IP address of that server?

Server: tenki.jp
Address: 153.125.234.6

2. Run nslookup to determine the authoritative DNS servers for a university in Europe.

Server: ox.ac.uk
Addresses: 151.101.194.216
151.101.2.216
151.101.66.216
151.101.130.216

3. Run nslookup so that one of the DNS servers obtained in Question 2 is queried for the mail servers for Yahoo! mail. What is its IP address?

The IP address that I received when I did “nslookup ox.ac.uk mail.yahoo.com” was the address 69.147.92.12

4. Locate the DNS query and response messages. Are they sent over UDP or TCP?

The DNS query seems to just be UDP, seen as it says “UDP payload” in the packet information.

5. What is the destination port for the DNS query message? What is the source port of the DNS response message?

The destination port is 53 for the query, while the source port of the response is 51110.

6. To what IP address is the DNS query message sent? Use ipconfig to determine the IP address of your local DNS server. Are these two IP addresses the same?

From wireshark, the DNS query is being sent to 192.168.86.1, while in using IP config, it can be seen that my WIFI local DNS server is also 192.168.86.1, showing that the 2 IP addresses are the same.

Question 4 continued:

7. Examine the DNS query message. What "Type" of DNS query is it? Does the query message contain any "answers"?

The query seems to just say "Standard DNS Query" and it seems to not have any type of response when expanded.

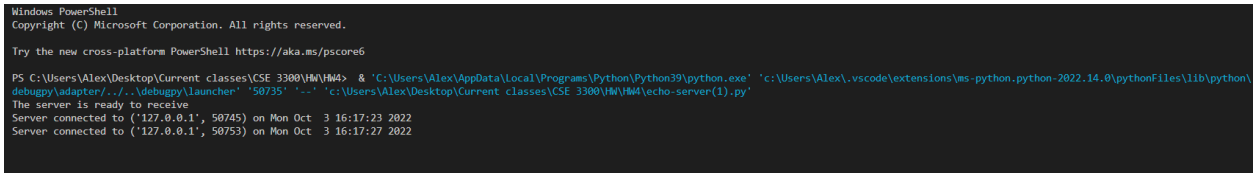
8. Examine the DNS response message. How many "answers" are provided? What do each of these answers contain?

It seems there 5 answers given when expanding the response message:

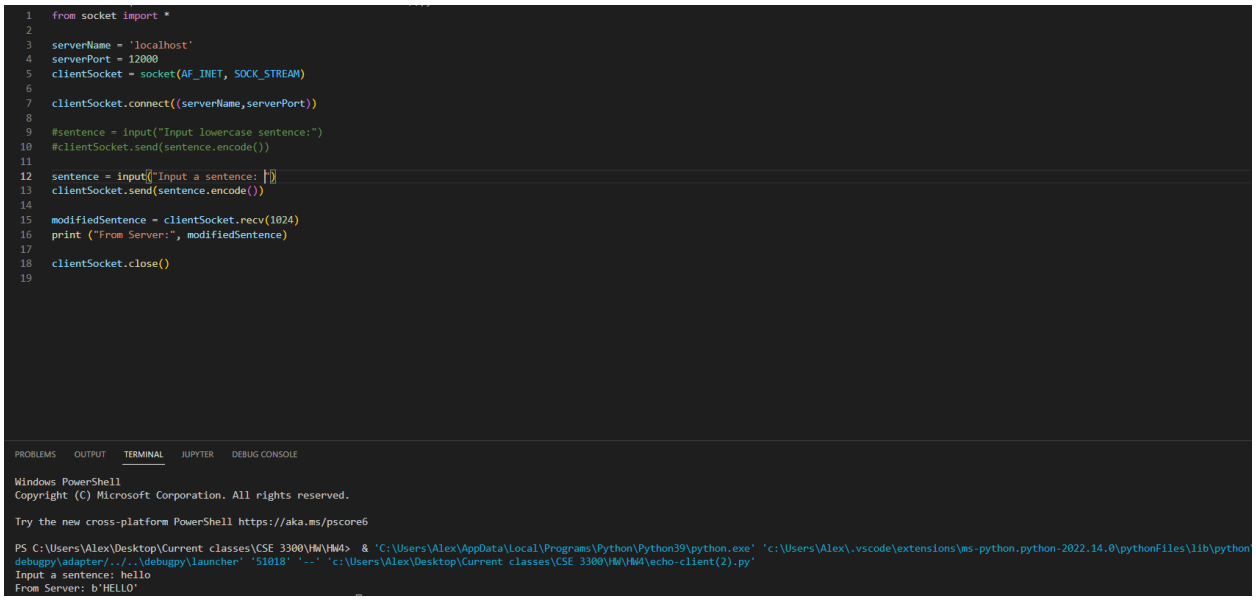
Name: www.ietf.org
Class: IN (0x0001)
Time to live: 1754 (29 minutes, 14 seconds)
Data length: 33
CNAME: www.ietf.org.cdn.cloudflare.net

Question 5:

1a. In the screenshot, it can be seen that there are 2 different clients connected to the server, all in the same local host, but one client is connected to port 50745 while the other is connected to 50753.



1b.



2a. If you just run the client program by itself, it does not work due to the fact that you are not putting in any parameters (i.e. it is using the default parameters from the program through the local host and port 50006), which is not what we need, as the server uses listens on port 50008. The error given is “Unable to connect to socket: [WinError 10061] No connection could be made because the target machine actively refused it”

2b. There are 2 different ways for someone to fix this problem. One easy way would be to run the program by just doing “python3 echo-client-better.py localhost 50008” basically choosing the correct port. Another way, would be to hard code it to the program by changing “server_port = 50006” to “server_port = 50008”