

### Exercise 3:

Question 1: dig www.amazon.com.au A in the answer section to get 108.158.18.170

Question 2: tp.04f01a85e-frontier.amazon.com.au. A canonical name is used so users can type www.amazon.com.au or directly amazon.com.au to properly direct the subdomains content

Question 3: EDNS:

Extention Mechanism for DNS is used for expanding the size of UDP packets due to limits in the existing DNS protocol, udp 1232

COOKIE: Cookie is a security feature containing a key

9446c6984643314c0100000067d97b8152f8c1194ded1a77 for example which is sent to a server then sent back to the client. In later queries the client will include to cookies to verify. Good in the response basically means verified.

Question 4: The ip address of the local nameserver is 129.94.242.2#53

```
;; SERVER: 129.94.242.2#53(129.94.242.2) (UDP)
```

Question 5:

Using dig amazon.com.au NS The dns nameservers are in the answer section in the image. ns2.amzndns.net for example

```
z5593541@v09:~$ dig amazon.com.au NS

;<>> DiG 9.18.33-1-deb12u2-Debian <>> amazon.com.au NS
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 28152
;; flags: qr rd ray QUERY: 1, ANSWER: 8, AUTHORITY: 0, ADDITIONAL: 9
;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags: udp: 1232
;; COOKIE: d97b8152f8c1194ded1a77 (good)
;; QUESTION SECTION:
;amazon.com.au.                IN      NS
;; ANSWER SECTION:
amazon.com.au.                533     IN      NS      ns2.amzndns.net.
amazon.com.au.                533     IN      NS      ns2.amzndns.co.uk.
amazon.com.au.                533     IN      NS      ns1.amzndns.com.
amazon.com.au.                533     IN      NS      ns1.amzndns.co.uk.
amazon.com.au.                533     IN      NS      ns2.amzndns.org.
amazon.com.au.                533     IN      NS      ns1.amzndns.net.
amazon.com.au.                533     IN      NS      ns2.amzndns.com.
;; ADDITIONAL SECTION:
ns1.amzndns.com.              1412    IN      A        156.154.64.10
ns1.amzndns.org.              1725    IN      A        156.154.66.10
ns2.amzndns.co.uk.            2087    IN      A        204.74.100.1
ns2.amzndns.com.              2589    IN      A        156.154.68.10
ns2.amzndns.net.              62      IN      A        156.154.69.10
ns2.amzndns.org.              2936    IN      A        156.154.150.1
ns1.amzndns.com.              1412    IN      AAAA     2001:502:f3ff:10
ns2.amzndns.com.              1548    IN      AAAA     2010:a1:1016:10

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2) (UDP)
;; WHEN: Tue Mar 11 13:28:12 AEDT 2025
;; MSG SIZE rcvd: 412
```

Question 6:

You would use dig -x 9.9.9.9: to find the DNS name, The name is dns9.quad9.net.

```
z5593541@v13:~/Desktop$ dig -x 9.9.9.9

;<>> DiG 9.18.33-1-deb12u2-Debian <>> -x 9.9.9.9
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 48217
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags: udp: 1232
;; COOKIE: 80f1fa750e83c9f70100000067d97f48e51065c02a3e7791 (good)
;; QUESTION SECTION:
;9.9.9.9.in-addr.arpa.        IN      PTR
;; ANSWER SECTION:
9.9.9.9.in-addr.arpa.        3050    IN      PTR      dns9.quad9.net.

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2) (UDP)
;; WHEN: Wed Mar 19 01:12:24 AEDT 2025
;; MSG SIZE rcvd: 105
```

### Question 7:

I did not get an authoritative answer, There is not flag aa, therefore there was no authoritative answer provided. CSE server does not have authority over yahoo

```
z5593541@vx09:~$ dig yahoo.com MX
; <<>> DiG 9.18.33-1~deb12u2-Debian <<>> yahoo.com MX
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 14884
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 20d8bb7f842f1a0100000067cf9e9305a8bc70f37dcef9 (good)
;; QUESTION SECTION:
;yahoo.com.                IN      MX

;; ANSWER SECTION:
yahoo.com.                1001    IN      MX      1 mta6.am0.yahoodns.net.
yahoo.com.                1001    IN      MX      1 mta5.am0.yahoodns.net.
yahoo.com.                1001    IN      MX      1 mta7.am0.yahoodns.net.

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2) (UDP)
;; WHEN: Tue Mar 11 13:23:15 AEDT 2025
;; MSG SIZE rcvd: 145
```

### Question 8:

From one of the nameservers in q5, you get the response REFUSED with a warning. This is because amazon does not host yahoo's records and therefore does not have authority.

```
z5593541@vx09:~$ dig @156.154.64.10 yahoo.com MX
; <<>> DiG 9.18.33-1~deb12u2-Debian <<>> @156.154.64.10 yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: REFUSED, id: 36630
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; EDE: 20 (Not Authoritative)
;; QUESTION SECTION:
;yahoo.com.                IN      MX

;; Query time: 0 msec
;; SERVER: 156.154.64.10#53(156.154.64.10) (UDP)
;; WHEN: Tue Mar 11 13:30:44 AEDT 2025
;; MSG SIZE rcvd: 44
```

### Question 9:

You would use the dns query dig @68.180.131.16 yahoo.com MX to obtain Yahoo's authoritative nameservers. Returning mta6.am0.yahoodns.net and 2 more etc.

```
z5593541@vx09:~$ dig @68.180.131.16 yahoo.com MX
; <<>> DiG 9.18.33-1~deb12u2-Debian <<>> @68.180.131.16 yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 23139
;; flags: qr aa rd; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1272
; COOKIE: a21629d8f5957d9b19fc32f267cfa0d567192c663860eb1b (good)
;; QUESTION SECTION:
;yahoo.com.                IN      MX

;; ANSWER SECTION:
yahoo.com.                1800    IN      MX      1 mta6.am0.yahoodns.net.
yahoo.com.                1800    IN      MX      1 mta7.am0.yahoodns.net.
yahoo.com.                1800    IN      MX      1 mta5.am0.yahoodns.net.

;; Query time: 155 msec
;; SERVER: 68.180.131.16#53(68.180.131.16) (UDP)
;; WHEN: Tue Mar 11 13:32:53 AEDT 2025
;; MSG SIZE rcvd: 145
```

Question 10:

<p>dig . NS to get 198.41.0.4</p>	<pre>z5593541@vx09:~\$ dig . NS ; &lt;&lt;&gt; DiG 9.18.33-1-deb12u2-Debian &lt;&lt;&gt; . NS ;; global options: +cmd ;; Got answer: ;; -&gt;&gt;HEADER&lt;&lt;- opcode: QUERY, status: NOERROR, id: 13219 ;; flags: qr rd ra ad; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 27  ;; OPT PSEUDOSECTION: ; EDNS: version: 0, flags:; udp: 1232 ; COOKIE: 6cc73c58df6529c00100000067cfa2bffc87b330be8012e3 (good) ;; QUESTION SECTION: ;.                               IN      NS  ;; ANSWER SECTION: .                               386496 IN      NS      f.root-servers.net. .                               386496 IN      NS      h.root-servers.net. .                               386496 IN      NS      e.root-servers.net. .                               386496 IN      NS      l.root-servers.net. .                               386496 IN      NS      b.root-servers.net. .                               386496 IN      NS      c.root-servers.net. .                               386496 IN      NS      j.root-servers.net. .                               386496 IN      NS      a.root-servers.net. .                               386496 IN      NS      d.root-servers.net. .                               386496 IN      NS      i.root-servers.net. .                               386496 IN      NS      k.root-servers.net. .                               386496 IN      NS      g.root-servers.net. .                               386496 IN      NS      m.root-servers.net.  ;; ADDITIONAL SECTION: a.root-servers.net.  559241 IN      A      198.41.0.4 b.root-servers.net.  382     IN      A      170.247.170.2 c.root-servers.net.  382     IN      A      192.33.4.12 d.root-servers.net.  382     IN      A      199.7.91.13 e.root-servers.net.  382     IN      A      192.203.230.10 f.root-servers.net.  591712 IN      A      192.5.5.241</pre>
<p>dig @198.41.0.4 vx09.cse.unsw.edu.au A to get the address records to find 65.22.199.1</p>	<pre>z5593541@vx09:~\$ dig @198.41.0.4 vx09.cse.unsw.edu.au A ; &lt;&lt;&gt; DiG 9.18.33-1-deb12u2-Debian &lt;&lt;&gt; @198.41.0.4 vx09.cse.unsw.edu.au A ; (1 server found) ;; global options: +cmd ;; Got answer: ;; -&gt;&gt;HEADER&lt;&lt;- opcode: QUERY, status: NOERROR, id: 43025 ;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 5, ADDITIONAL: 11 ;; WARNING: recursion requested but not available  ;; OPT PSEUDOSECTION: ; EDNS: version: 0, flags:; udp: 4096 ;; QUESTION SECTION: ;vx09.cse.unsw.edu.au.          IN      A  ;; AUTHORITY SECTION: au.                             172800 IN      NS      t.au. au.                             172800 IN      NS      r.au. au.                             172800 IN      NS      a.au. au.                             172800 IN      NS      s.au. au.                             172800 IN      NS      q.au.  ;; ADDITIONAL SECTION: t.au.                           172800 IN      A      65.22.199.1 t.au.                           172800 IN      AAAA   2a01:8840:c1::1 r.au.                           172800 IN      A      65.22.197.1 r.au.                           172800 IN      AAAA   2a01:8840:bf::1 a.au.                           172800 IN      A      58.65.254.1 a.au.                           172800 IN      AAAA   2407:6e00:254::1 s.au.                           172800 IN      A      65.22.198.1 s.au.                           172800 IN      AAAA   2a01:8840:c0::1 q.au.                           172800 IN      A      65.22.196.1 q.au.                           172800 IN      AAAA   2a01:8840:be::1  ;; Query time: 155 msec ;; SERVER: 198.41.0.4#53(198.41.0.4) (UDP) ;; WHEN: Tue Mar 11 13:41:53 AEDT 2025 ;; MSG SIZE rcvd: 349</pre>

dig @65.22.199.1 vx09.cse.unsw.edu.au A  
to find 54.79.80.189

```
z5593541@vx09:~$ dig @65.22.199.1 vx09.cse.unsw.edu.au A
; <<>> DiG 9.18.33-1-deb12u2-Debian <<>> @65.22.199.1 vx09.cse.unsw.edu.au A
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 24719
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 3, ADDITIONAL: 7
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
;; QUESTION SECTION:
;vx09.cse.unsw.edu.au.      IN      A

;; AUTHORITY SECTION:
unsw.edu.au.              3600    IN      NS      ns1-ext.unsw.edu.au.
unsw.edu.au.              3600    IN      NS      ns2-ext.unsw.edu.au.
unsw.edu.au.              3600    IN      NS      ns3-ext.unsw.edu.au.

;; ADDITIONAL SECTION:
ns1-ext.unsw.edu.au.      3600    IN      A        54.79.80.189
ns1-ext.unsw.edu.au.      3600    IN      AAAA     2001:388:c:35::11
ns2-ext.unsw.edu.au.      3600    IN      A        13.236.238.52
ns2-ext.unsw.edu.au.      3600    IN      AAAA     2001:388:c:35::22
ns3-ext.unsw.edu.au.      3600    IN      A        54.66.99.146
ns3-ext.unsw.edu.au.      3600    IN      AAAA     2001:388:c:35::33

;; Query time: 3 msec
;; SERVER: 65.22.199.1#53(65.22.199.1) (UDP)
;; WHEN: Tue Mar 11 13:43:27 AEDT 2025
;; MSG SIZE rcvd: 247
```

dig @54.79.80.189 vx09.cse.unsw.edu.au  
A to find 129.94.172.11

```
z5593541@vx09:~$ dig @54.79.80.189 vx09.cse.unsw.edu.au A
; <<>> DiG 9.18.33-1-deb12u2-Debian <<>> @54.79.80.189 vx09.cse.unsw.edu.au A
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 17249
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 2, ADDITIONAL: 5
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1220
; COOKIE: 3bb83a9f141eaf270100000067cfa37d2c583067953e4dfe (good)
;; QUESTION SECTION:
;vx09.cse.unsw.edu.au.      IN      A

;; AUTHORITY SECTION:
cse.unsw.edu.au.          10800   IN      NS      maestro.orchestra.cse.unsw.edu.au.
cse.unsw.edu.au.          10800   IN      NS      beethoven.orchestra.cse.unsw.edu.au.

;; ADDITIONAL SECTION:
beethoven.orchestra.cse.unsw.edu.au. 10800   IN      A        129.94.172.11
beethoven.orchestra.cse.unsw.edu.au. 10800   IN      A        129.94.208.3
beethoven.orchestra.cse.unsw.edu.au. 10800   IN      A        129.94.242.2
maestro.orchestra.cse.unsw.edu.au. 10800   IN      A        129.94.242.33

;; Query time: 3 msec
;; SERVER: 54.79.80.189#53(54.79.80.189) (UDP)
;; WHEN: Tue Mar 11 13:44:13 AEDT 2025
;; MSG SIZE rcvd: 212
```

dig @129.94.172.11 vx09.cse.unsw.edu.au  
A to get 129.94.242.139. The flag aa stand  
for authoritative address therefore we found  
the authoritative nameserver.

Therefore 5 dns servers were queried to  
find the authoritative answer.

```
z5593541@vx09:~$ dig @129.94.172.11 vx09.cse.unsw.edu.au A
; <<>> DiG 9.18.33-1-deb12u2-Debian <<>> @129.94.172.11 vx09.cse.unsw.edu.au A
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 10541
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 3215d752f6a173df0100000067cfa3f6ab7441919489d421 (good)
;; QUESTION SECTION:
;vx09.cse.unsw.edu.au.      IN      A

;; ANSWER SECTION:
vx09.cse.unsw.edu.au.      3600    IN      A        129.94.242.139

;; Query time: 0 msec
;; SERVER: 129.94.172.11#53(129.94.172.11) (UDP)
;; WHEN: Tue Mar 11 13:46:14 AEDT 2025
;; MSG SIZE rcvd: 113
```

Question 11: One physical machine can have several names and/or IP addresses associated with it, for example multiple aliases or CNAMEs that all point to one server. A machine could also have Ip aliases one for internal or external or ipv4 and ipv6