

Exercise 3.

1. 150.203.161.98

type is A

DIG OUTPUT

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> www.cecs.anu.edu.au

;; global options: +cmd

;; Got answer:

;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 30317

;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 3, ADDITIONAL: 7

;; OPT PSEUDOSECTION:

; EDNS: version: 0, flags:;, udp: 4096

;; QUESTION SECTION:

www.cecs.anu.edu.au. IN A

;; ANSWER SECTION:

www.cecs.anu.edu.au. 2600 IN CNAME rproxy.cecs.anu.edu.au.

rproxy.cecs.anu.edu.au. 1453 IN A 150.203.161.98

;; AUTHORITY SECTION:

cecs.anu.edu.au. 5 IN NS ns2.cecs.anu.edu.au.

cecs.anu.edu.au. 5 IN NS ns4.cecs.anu.edu.au.

cecs.anu.edu.au. 5 IN NS ns3.cecs.anu.edu.au.

;; ADDITIONAL SECTION:

ns2.cecs.anu.edu.au. 1090 IN A 150.203.161.36

ns2.cecs.anu.edu.au. 354 IN AAAA 2001:388:1034:2905::24

ns3.cecs.anu.edu.au. 1786 IN A 150.203.161.50

ns3.cecs.anu.edu.au. 965 IN AAAA 2001:388:1034:2905::32

ns4.cecs.anu.edu.au. 963 IN A 150.203.161.38

```
ns4.cecs.anu.edu.au. 965 IN AAAA 2001:388:1034:2905::26
```

```
;; Query time: 0 msec
```

```
;; SERVER: 129.94.208.2#53(129.94.208.2)
```

```
;; WHEN: Thu Oct 10 13:34:52 AEDT 2019
```

```
;; MSG SIZE rcvd: 271
```

2. Canonical name is: rproxy.cecs.anu.edu.au.

Reason for having an alias for this server is that you can run multiple services on different ports on a single IP address

3. The authority section shows the servers that are the ultimate authority for answering DNS queries about that domain. The additional section shows the IP addresses of the DNS servers that are in the authority section.

4. 129.94.208.2

```
##### DIG OUTPUT #####
```

```
; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> localhost
```

```
;; global options: +cmd
```

```
;; Got answer:
```

```
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 15171
```

```
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 2
```

```
;; OPT PSEUDOSECTION:
```

```
; EDNS: version: 0, flags;; udp: 4096
```

```
;; QUESTION SECTION:
```

```
;localhost. IN A
```

```
;; ANSWER SECTION:
```

```
localhost. 86400 IN A 127.0.0.1
```

```
;; AUTHORITY SECTION:
```

```
localhost. 86400 IN NS localhost.
```

:: ADDITIONAL SECTION:

localhost. 86400 IN AAAA ::1

:: Query time: 4 msec

:: SERVER: 129.94.208.2#53(129.94.208.2)

:: WHEN: Thu Oct 10 13:37:01 AEDT 2019

:: MSG SIZE rcvd: 96

5. ns4.cecs.anu.edu.au. IP address: 150.203.161.38

ns3.cecs.anu.edu.au. IP address: 150.203.161.50

ns2.cecs.anu.edu.au. IP address: 150.203.161.36

type A DNS queries are sent to find this information

DIG OUTPUT

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> cecs.anu.edu.au

:: global options: +cmd

:: Got answer:

:: ->HEADER<- opcode: QUERY, status: NOERROR, id: 11409

:: flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 3, ADDITIONAL: 7

:: OPT PSEUDOSECTION:

; EDNS: version: 0, flags:; udp: 4096

:: QUESTION SECTION:

;cecs.anu.edu.au. IN A

:: ANSWER SECTION:

cecs.anu.edu.au. 249 IN A 150.203.161.98

:: AUTHORITY SECTION:

cecs.anu.edu.au. 13 IN NS ns2.cecs.anu.edu.au.

```
cecs.anu.edu.au.      13      IN      NS      ns3.cecs.anu.edu.au.
cecs.anu.edu.au.      13      IN      NS      ns4.cecs.anu.edu.au.
```

```
:: ADDITIONAL SECTION:
```

```
ns2.cecs.anu.edu.au.  249      IN      A       150.203.161.36
ns2.cecs.anu.edu.au.  124      IN      AAAA    2001:388:1034:2905::24
ns3.cecs.anu.edu.au.  945      IN      A       150.203.161.50
ns3.cecs.anu.edu.au.  124      IN      AAAA    2001:388:1034:2905::32
ns4.cecs.anu.edu.au.  122      IN      A       150.203.161.38
ns4.cecs.anu.edu.au.  124      IN      AAAA    2001:388:1034:2905::26
```

```
:: Query time: 0 msec
```

```
:: SERVER: 129.94.208.2#53(129.94.208.2)
```

```
:: WHEN: Thu Oct 10 13:48:53 AEDT 2019
```

```
:: MSG SIZE rcvd: 246
```

```
6. a.root-servers.net.
```

```
type SOA
```

```
##### DIG OUTPUT #####
```

```
; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> 111.68.101.54
```

```
:: global options: +cmd
```

```
:: Got answer:
```

```
:: ->>HEADER<<- opcode: QUERY, status: NXDOMAIN, id: 52484
```

```
:: flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1
```

```
:: OPT PSEUDOSECTION:
```

```
; EDNS: version: 0, flags:; udp: 4096
```

```
:: QUESTION SECTION:
```

```
;111.68.101.54.          IN      A
```

```
:: AUTHORITY SECTION:
```

```
.                7580   IN      SOA      a.root-servers.net. nstld.verisign-grs.com.
2019100901 1800 900 604800 86400
```

```
:: Query time: 0 msec
```

```
:: SERVER: 129.94.208.2#53(129.94.208.2)
```

```
:: WHEN: Thu Oct 10 13:46:22 AEDT 2019
```

```
:: MSG SIZE rcvd: 117
```

7. No i didn't get an authoritative answer - there is no AA flag

```
##### DIG OUTPUT #####
```

```
; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.242.33 yahoo.com mx
```

```
; (1 server found)
```

```
:: global options: +cmd
```

```
:: Got answer:
```

```
:: ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 59260
```

```
:: flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 9
```

```
:: OPT PSEUDOSECTION:
```

```
; EDNS: version: 0, flags::; udp: 4096
```

```
:: QUESTION SECTION:
```

```
;yahoo.com.                IN      MX
```

```
:: ANSWER SECTION:
```

```
yahoo.com.                238     IN      MX      1 mta5.am0.yahoodns.net.
```

```
yahoo.com.                238     IN      MX      1 mta6.am0.yahoodns.net.
```

```
yahoo.com.                238     IN      MX      1 mta7.am0.yahoodns.net.
```

```
:: AUTHORITY SECTION:
```

```
yahoo.com.                36392   IN      NS      ns3.yahoo.com.
```

```
yahoo.com.                36392   IN      NS      ns1.yahoo.com.
```

```
yahoo.com.      36392 IN      NS      ns2.yahoo.com.
yahoo.com.      36392 IN      NS      ns5.yahoo.com.
yahoo.com.      36392 IN      NS      ns4.yahoo.com.
```

```
:: ADDITIONAL SECTION:
```

```
ns1.yahoo.com.  299380 IN      A       68.180.131.16
ns1.yahoo.com.  60705  IN      AAAA    2001:4998:130::1001
ns2.yahoo.com.  64015  IN      A       68.142.255.16
ns2.yahoo.com.  68029  IN      AAAA    2001:4998:140::1002
ns3.yahoo.com.  263    IN      A       27.123.42.42
ns3.yahoo.com.  263    IN      AAAA    2406:8600:f03f:1f8::1003
ns4.yahoo.com.  123456 IN      A       98.138.11.157
ns5.yahoo.com.  126654 IN      A       119.160.253.83
```

```
:: Query time: 0 msec
```

```
:: SERVER: 129.94.242.33#53(129.94.242.33)
```

```
:: WHEN: Sun Oct 13 23:59:21 AEDT 2019
```

```
:: MSG SIZE rcvd: 371
```

8. It gives an authoritative answer because of the AA flag

```
##### DIG OUTPUT #####
```

```
; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @150.203.161.36 cecs.anu.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 30319
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 3, ADDITIONAL: 7
;; WARNING: recursion requested but not available
```

```
:: OPT PSEUDOSECTION:
```

; EDNS: version: 0, flags:; udp: 4096

;; QUESTION SECTION:

cecs.anu.edu.au. IN A

;; ANSWER SECTION:

cecs.anu.edu.au. 3600 IN A 150.203.161.98

;; AUTHORITY SECTION:

cecs.anu.edu.au. 3600 IN NS ns4.cecs.anu.edu.au.

cecs.anu.edu.au. 3600 IN NS ns3.cecs.anu.edu.au.

cecs.anu.edu.au. 3600 IN NS ns2.cecs.anu.edu.au.

;; ADDITIONAL SECTION:

ns2.cecs.anu.edu.au. 3600 IN A 150.203.161.36

ns3.cecs.anu.edu.au. 3600 IN A 150.203.161.50

ns4.cecs.anu.edu.au. 3600 IN A 150.203.161.38

ns2.cecs.anu.edu.au. 3600 IN AAAA 2001:388:1034:2905::24

ns3.cecs.anu.edu.au. 3600 IN AAAA 2001:388:1034:2905::32

ns4.cecs.anu.edu.au. 3600 IN AAAA 2001:388:1034:2905::26

;; Query time: 9 msec

;; SERVER: 150.203.161.36#53(150.203.161.36)

;; WHEN: Thu Oct 10 13:52:39 AEDT 2019

;; MSG SIZE rcvd: 246

9. mx DNS query is sent to obtain this information

DIG OUTPUT

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @68.180.131.16 yahoo.com mx

; (1 server found)

;; global options: +cmd

:: Got answer:

:: ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 17981

:: flags: qr aa rd; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 9

:: WARNING: recursion requested but not available

:: OPT PSEUDOSECTION:

; EDNS: version: 0, flags:;, udp: 1272

:: QUESTION SECTION:

yahoo.com.	IN	MX
------------	----	----

:: ANSWER SECTION:

yahoo.com.	1800	IN	MX	1 mta5.am0.yahoodns.net.
yahoo.com.	1800	IN	MX	1 mta7.am0.yahoodns.net.
yahoo.com.	1800	IN	MX	1 mta6.am0.yahoodns.net.

:: AUTHORITY SECTION:

yahoo.com.	172800	IN	NS	ns4.yahoo.com.
yahoo.com.	172800	IN	NS	ns2.yahoo.com.
yahoo.com.	172800	IN	NS	ns1.yahoo.com.
yahoo.com.	172800	IN	NS	ns3.yahoo.com.
yahoo.com.	172800	IN	NS	ns5.yahoo.com.

:: ADDITIONAL SECTION:

ns1.yahoo.com.	1209600	IN	A	68.180.131.16
ns2.yahoo.com.	1209600	IN	A	68.142.255.16
ns3.yahoo.com.	1800	IN	A	27.123.42.42
ns4.yahoo.com.	1209600	IN	A	98.138.11.157
ns5.yahoo.com.	1209600	IN	A	119.160.253.83
ns1.yahoo.com.	86400	IN	AAAA	2001:4998:130::1001
ns2.yahoo.com.	86400	IN	AAAA	2001:4998:140::1002
ns3.yahoo.com.	1800	IN	AAAA	2406:8600:f03f:1f8::1003


```
:: Query time: 145 msec
:: SERVER: 68.180.131.16#53(68.180.131.16)
:: WHEN: Mon Oct 14 00:07:24 AEDT 2019
:: MSG SIZE rcvd: 371
```

10. Commands:

```
dig .
dig a.root-servers.net.
dig @199.9.14.201 au.
dig @58.65.254.73 edu.au.
dig @65.22.196.1 unsw.edu.au
dig @129.94.0.192 cse.unsw.edu.au
dig @129.94.172.11 150.203.161.98
Querying 6 servers
##### DIG OUTPUT #####
; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> .
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 37259
;; flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1
```

;; OPT PSEUDOSECTION:

```
; EDNS: version: 0, flags;; udp: 4096
```

;; QUESTION SECTION:

```
.;                               IN      A
```

;; AUTHORITY SECTION:

```
.                1739    IN      SOA      a.root-servers.net. nstld.verisign-grs.com.
2019101300 1800 900 604800 86400
```

:: Query time: 0 msec

:: SERVER: 129.94.242.45#53(129.94.242.45)

:: WHEN: Mon Oct 14 00:11:03 AEDT 2019

:: MSG SIZE rcvd: 103

DIG OUTPUT

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> a.root-servers.net.

:: global options: +cmd

:: Got answer:

:: ->HEADER<<- opcode: QUERY, status: NOERROR, id: 31892

:: flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 13, ADDITIONAL: 26

:: OPT PSEUDOSECTION:

; EDNS: version: 0, flags:; udp: 4096

:: QUESTION SECTION:

a.root-servers.net.	IN	A
---------------------	----	---

:: ANSWER SECTION:

a.root-servers.net.	52896	IN	A	198.41.0.4
---------------------	-------	----	---	------------

:: AUTHORITY SECTION:

root-servers.net.	32826	IN	NS	c.root-servers.net.
root-servers.net.	32826	IN	NS	h.root-servers.net.
root-servers.net.	32826	IN	NS	g.root-servers.net.
root-servers.net.	32826	IN	NS	d.root-servers.net.
root-servers.net.	32826	IN	NS	j.root-servers.net.
root-servers.net.	32826	IN	NS	l.root-servers.net.
root-servers.net.	32826	IN	NS	f.root-servers.net.
root-servers.net.	32826	IN	NS	e.root-servers.net.
root-servers.net.	32826	IN	NS	k.root-servers.net.
root-servers.net.	32826	IN	NS	b.root-servers.net.

root-servers.net.	32826	IN	NS	i.root-servers.net.
root-servers.net.	32826	IN	NS	a.root-servers.net.
root-servers.net.	32826	IN	NS	m.root-servers.net.

;; ADDITIONAL SECTION:

a.root-servers.net.	115989	IN	AAAA	2001:503:ba3e::2:30
b.root-servers.net.	242027	IN	A	199.9.14.201
b.root-servers.net.	143502	IN	AAAA	2001:500:200::b
c.root-servers.net.	79394	IN	A	192.33.4.12
c.root-servers.net.	143502	IN	AAAA	2001:500:2::c
d.root-servers.net.	240760	IN	A	199.7.91.13
d.root-servers.net.	490136	IN	AAAA	2001:500:2d::d
e.root-servers.net.	375031	IN	A	192.203.230.10
e.root-servers.net.	279569	IN	AAAA	2001:500:a8::e
f.root-servers.net.	216852	IN	A	192.5.5.241
f.root-servers.net.	483419	IN	AAAA	2001:500:2f::f
g.root-servers.net.	297580	IN	A	192.112.36.4
g.root-servers.net.	304769	IN	AAAA	2001:500:12::d0d
h.root-servers.net.	300542	IN	A	198.97.190.53
h.root-servers.net.	490136	IN	AAAA	2001:500:1::53
i.root-servers.net.	217680	IN	A	192.36.148.17
i.root-servers.net.	135587	IN	AAAA	2001:7fe::53
j.root-servers.net.	161338	IN	A	192.58.128.30
j.root-servers.net.	24979	IN	AAAA	2001:503:c27::2:30
k.root-servers.net.	240753	IN	A	193.0.14.129
k.root-servers.net.	135587	IN	AAAA	2001:7fd::1
l.root-servers.net.	316441	IN	A	199.7.83.42
l.root-servers.net.	143502	IN	AAAA	2001:500:9f::42
m.root-servers.net.	240757	IN	A	202.12.27.33
m.root-servers.net.	24979	IN	AAAA	2001:dc3::35

DIG OUTPUT

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @199.9.14.201 au

; (1 server found)

:: global options: +cmd

:: Got answer:

:: ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 33489

:: flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 9, ADDITIONAL: 18

:: WARNING: recursion requested but not available

:: OPT PSEUDOSECTION:

; EDNS: version: 0, flags:; udp: 4096

:: QUESTION SECTION:

;au. IN A

:: AUTHORITY SECTION:

au.	172800 IN	NS	a.au.
au.	172800 IN	NS	u.au.
au.	172800 IN	NS	r.au.
au.	172800 IN	NS	t.au.
au.	172800 IN	NS	d.au.
au.	172800 IN	NS	c.au.
au.	172800 IN	NS	v.au.
au.	172800 IN	NS	q.au.
au.	172800 IN	NS	s.au.

:: ADDITIONAL SECTION:

a.au.	172800 IN	A	58.65.254.73
c.au.	172800 IN	A	162.159.24.179
d.au.	172800 IN	A	162.159.25.38
q.au.	172800 IN	A	65.22.196.1
r.au.	172800 IN	A	65.22.197.1

s.au.	172800 IN	A	65.22.198.1
t.au.	172800 IN	A	65.22.199.1
u.au.	172800 IN	A	211.29.133.32
v.au.	172800 IN	A	202.12.31.53
a.au.	172800 IN	AAAA	2407:6e00:254:306::73
c.au.	172800 IN	AAAA	2400:cb00:2049:1::a29f:18b3
d.au.	172800 IN	AAAA	2400:cb00:2049:1::a29f:1926
q.au.	172800 IN	AAAA	2a01:8840:be::1
r.au.	172800 IN	AAAA	2a01:8840:bf::1
s.au.	172800 IN	AAAA	2a01:8840:c0::1
t.au.	172800 IN	AAAA	2a01:8840:c1::1
v.au.	172800 IN	AAAA	2001:dd8:12::53

;; Query time: 163 msec

;; SERVER: 199.9.14.201#53(199.9.14.201)

;; WHEN: Mon Oct 14 00:12:49 AEDT 2019

;; MSG SIZE rcvd: 543

DIG OUTPUT

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @58.65.254.73 edu.au.

; (1 server found)

;; global options: +cmd

;; Got answer:

;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 35839

;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 4, ADDITIONAL: 9

;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:

; EDNS: version: 0, flags:; udp: 4096

;; QUESTION SECTION:

;edu.au. IN A

;; AUTHORITY SECTION:

edu.au.	86400	IN	NS	q.au.
edu.au.	86400	IN	NS	r.au.
edu.au.	86400	IN	NS	t.au.
edu.au.	86400	IN	NS	s.au.

;; ADDITIONAL SECTION:

q.au.	86400	IN	A	65.22.196.1
r.au.	86400	IN	A	65.22.197.1
s.au.	86400	IN	A	65.22.198.1
t.au.	86400	IN	A	65.22.199.1
q.au.	86400	IN	AAAA	2a01:8840:be::1
r.au.	86400	IN	AAAA	2a01:8840:bf::1
s.au.	86400	IN	AAAA	2a01:8840:c0::1
t.au.	86400	IN	AAAA	2a01:8840:c1::1

;; Query time: 14 msec

;; SERVER: 58.65.254.73#53(58.65.254.73)

;; WHEN: Mon Oct 14 00:20:46 AEDT 2019

;; MSG SIZE rcvd: 275

DIG OUTPUT

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @65.22.196.1 unsw.edu.au

; (1 server found)

;; global options: +cmd

;; Got answer:

;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 9042

;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 3, ADDITIONAL: 6

;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:

; EDNS: version: 0, flags:; udp: 4096

;; QUESTION SECTION:

;unsw.edu.au. IN A

;; AUTHORITY SECTION:

unsw.edu.au. 900 IN NS ns3.unsw.edu.au.

unsw.edu.au. 900 IN NS ns1.unsw.edu.au.

unsw.edu.au. 900 IN NS ns2.unsw.edu.au.

;; ADDITIONAL SECTION:

ns1.unsw.edu.au. 900 IN A 129.94.0.192

ns2.unsw.edu.au. 900 IN A 129.94.0.193

ns3.unsw.edu.au. 900 IN A 192.155.82.178

ns1.unsw.edu.au. 900 IN AAAA 2001:388:c:35::1

ns2.unsw.edu.au. 900 IN AAAA 2001:388:c:35::2

;; Query time: 7 msec

;; SERVER: 65.22.196.1#53(65.22.196.1)

;; WHEN: Mon Oct 14 00:22:03 AEDT 2019

;; MSG SIZE rcvd: 198

DIG OUTPUT

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.0.192 cse.unsw.edu.au

; (1 server found)

;; global options: +cmd

;; Got answer:

;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 38279

;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 2, ADDITIONAL: 5

;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:

; EDNS: version: 0, flags:; udp: 4096

;; QUESTION SECTION:

;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: 129.94.0.192#53(129.94.0.192)

;; WHEN: Mon Oct 14 00:23:21 AEDT 2019

;; MSG SIZE rcvd: 164

11. Yes