

ECS 152A - Project 2 - Part C

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Question (a)

```
HanMBP:~ hanthesuperman$ dig www.cs.ucdavis.edu +trace
; <<> DiG 9.10.6 <<> www.cs.ucdavis.edu +trace
;; global options: +cmd
476329 IN NS e.root-servers.net.
476329 IN NS h.root-servers.net.
476329 IN NS l.root-servers.net.
476329 IN NS i.root-servers.net.
476329 IN NS a.root-servers.net.
476329 IN NS d.root-servers.net.
476329 IN NS c.root-servers.net.
476329 IN NS b.root-servers.net.
476329 IN NS j.root-servers.net.
476329 IN NS k.root-servers.net.
476329 IN NS g.root-servers.net.
476329 IN NS m.root-servers.net.
476329 IN NS f.root-servers.net.
476329 IN RRSIG NS 8 0 518400 20210306170000 20210221160000 42351 . XnuKeo0a89Eqx18mZGhagMJETHNd05MqwedxSYPKyMDYT1F7KLdHmtOf aDKJNMoQ614E/dqPU9D4Fmnlm9aJgmCCjUyrTh
ns10a4EThnwF0K9mSK ygsd39a4E1Dl1lu74Lr23IccPxyS4r3B3voroU350kwQ49+ancn6zX VoEZ2stf18y77CsyVKmaJEFqZ/M8C1m7K+VuXrEg1l1nW4X/Okp043C5 e1/QEOwAAE4pxMHZPrQY+cYq68cyMARc11L+DJcK8vc3h14KODt3HW+Z Vxsl/
X7c1C6o6ldqrj0xi58ux971DpuF0nZu94YR82H/NOY0NMdV7m VKuioa==
;; Received 1097 bytes from 192.168.1.1#53(192.168.1.1) in 48 ms

edu. 172800 IN NS b.edu-servers.net.
edu. 172800 IN NS f.edu-servers.net.
edu. 172800 IN NS i.edu-servers.net.
edu. 172800 IN NS a.edu-servers.net.
edu. 172800 IN NS g.edu-servers.net.
edu. 172800 IN NS j.edu-servers.net.
edu. 172800 IN NS k.edu-servers.net.
edu. 172800 IN NS m.edu-servers.net.
edu. 172800 IN NS l.edu-servers.net.
edu. 172800 IN NS h.edu-servers.net.
edu. 172800 IN NS c.edu-servers.net.
edu. 172800 IN NS e.edu-servers.net.
edu. 172800 IN NS d.edu-servers.net.
edu. 86400 IN DS 28045 8 2 4172496CDE85534E511290403558D0481FCFEBAE996DFDDE652006F6 F882CE76
edu. 86400 IN RRSIG DS 8 1 86400 20210306170000 20210221160000 42351 . aN4aKz1St6X1rwcM2Bzyny5kbvFVhltUMrJyNaf1o3VBDEvgT06j78iY 4uX7LevcH1Qwc4qj/QEMatU2ehIrr7zxMriJGjsP
jG6L/dRP/1ULqii9n kt860NjhaZQnQaQZNdYdZky7aEz/BTXN3GF/8PyThiCdUxwW8RU7D1b dM3V6rOGAwHJ/QwrolzVCuRMjTPnWoiH9ssbwrkQPJfjdbNmMAUjBEZs h4Vi+J7IQnUEBbLahR4iKE74FTShyOrZMKfgKCwcowKkhywNDjdcakS 1ijrUC
+V/UXgE93UYMoIdjMxYkaAwcNaEEF2WnmUDKPlamRsnFD26se TB7MIw==
;; Received 1177 bytes from 198.41.0.4#53(a.root-servers.net) in 22 ms

ucdavis.edu. 172800 IN NS dns-two.ucdavis.edu.
ucdavis.edu. 172800 IN NS dns-one.ucdavis.edu.
ucdavis.edu. 172800 IN NS dns-three.ucdavis.edu.
ucdavis.edu. 86400 IN DS 39682 8 2 36694C20C082DA23204F80F4751B8250ADD0ABFF37C1D17E6993FC43 BF46AC71
ucdavis.edu. 86400 IN DS 39682 8 1 550654FC8D7FF542450741F579031476B5144E3B
ucdavis.edu. 86400 IN DS 42136 8 2 25F196AE188147BCBEAA81DE06A49903C03118FA5CDF5F7846974A7 553E5121
ucdavis.edu. 86400 IN RRSIG DS 8 2 86400 20210225085149 20210218074149 62987 edu. P+1EvYfwhsNC9MCRpp40T31QwEuDHyDKsnJSuqecYssZjAwc+1XxEz zrIxrPrVzcVInQwQ38ht2QEQd8ZCgE1+Zzx
10i1oUebK1kUDYH6D6xh bRxAAS3dP9SGYBtmvTSY184oZohrLqxAeEtRKAZQ4i1nrtf4eXnceT jx34qNsyfy1LmJD106UNGLY3JULVpy2/Mnte6/8muTViKA==
;; Received 574 bytes from 192.26.92.30#53(c.edu-servers.net) in 34 ms

www.cs.ucdavis.edu. 28800 IN A 169.237.212.78
cs.ucdavis.edu. 28800 IN NS dns-one.ucdavis.edu.
cs.ucdavis.edu. 28800 IN NS dns-two.ucdavis.edu.
cs.ucdavis.edu. 28800 IN NS dns-three.ucdavis.edu.
```

Figure 1: www.cs.ucdavis.edu using "dig"

As shown in Figure 1, by typing "dig www.cs.ucdavis.edu +trace", the list of the names of DNS servers in the delegation chain is:

a.root-servers.net

c.edu-servers.net

dns-two.ucdavis.edu

dns-one.ucdavis.edu

Question (b)

```
<<>> DiG 9.10.6 <<>> www.google.com +trace
;; global options: +cmd
.      476000 IN      NS      g.root-servers.net.
.      476000 IN      NS      h.root-servers.net.
.      476000 IN      NS      i.root-servers.net.
.      476000 IN      NS      j.root-servers.net.
.      476000 IN      NS      k.root-servers.net.
.      476000 IN      NS      l.root-servers.net.
.      476000 IN      NS      m.root-servers.net.
.      476000 IN      NS      a.root-servers.net.
.      476000 IN      NS      b.root-servers.net.
.      476000 IN      NS      c.root-servers.net.
.      476000 IN      NS      d.root-servers.net.
.      476000 IN      NS      e.root-servers.net.
.      476000 IN      NS      f.root-servers.net.
.      476000 IN      RRSIG   NS 8 0 518400 20210306170000 202102221160000 42351 . XnuKeo0a89EQx1BmZGhagMJETHNd05MqwedxSYPKyMDY1Tf7KLdHmtof aDKJNM0614E/dqPU9D4Fmni9sJgmCCjUyrTh
ns10q4ETHwnf0K9mSK yq+sC3p64EiDliiqu74Lr2SiccPxyS4r3B3vorouU350kwQ49+ancn6zX VoEZ2stfiBy77CsyVKmajEFqZ/M8C1m7K+VuXrEgLL1nW4X/OKp043C5 eT/QEOwAAE4pxMHZPrQY+cYq68cyMARc1iL+DJcK8vc3h14K0Dt3HW+Z Vxsl/
X7cJC6o6Ldqrj8xi58ux97iDpufQnZuU94YR82H/hOY0NNm0v7w VKuimA==
;; Received 1097 bytes from 192.168.1.1#53(192.168.1.1) in 89 ms

com.   172800 IN      NS      a.gtld-servers.net.
com.   172800 IN      NS      b.gtld-servers.net.
com.   172800 IN      NS      c.gtld-servers.net.
com.   172800 IN      NS      d.gtld-servers.net.
com.   172800 IN      NS      e.gtld-servers.net.
com.   172800 IN      NS      f.gtld-servers.net.
com.   172800 IN      NS      g.gtld-servers.net.
com.   172800 IN      NS      h.gtld-servers.net.
com.   172800 IN      NS      i.gtld-servers.net.
com.   172800 IN      NS      j.gtld-servers.net.
com.   172800 IN      NS      k.gtld-servers.net.
com.   172800 IN      NS      l.gtld-servers.net.
com.   172800 IN      NS      m.gtld-servers.net.
com.   86400  IN      DS      30909 8 2 E2D3C916F6DEEAC73294E8268FB5885044A833FC6459588F4A9184CF C41A5766
com.   86400  IN      RRSIG   DS 8 1 86400 20210306170000 202102221160000 42351 . JI+Z/ftJwoLjybAxp3n8kDPyWR3RgnP/W1Kccq8E1lGh9XJ317e18Eg4i gKcW1Pyiqq1W31vzk0EiDPiXIPnoicWzFB7MtJW
qNNK73XRFyTmDg92 jmVxuiVnuvQ1K63C9vblH2hd00c2aLjWahOHxwdZ29c3zt09zhSQXjr aKrPuewKnvJxGF5Wx0qIWhexkIgAyKxrSESE01lYs+u78j1enso+En6 VsNhiFe6nF3XtGhhu9VH6G4bZ1N0JgJ3+osbnC6z0KaBwqHXTZwaWYwd 8f6h2E
9eac0gLNzzYAetYSNzyWAHbqBNcm1nAqUjqZd1U13Ei1bphm Hc1lTw==
;; Received 1174 bytes from 199.7.83.42#53(l.root-servers.net) in 24 ms

google.com. 172800 IN      NS      ns2.google.com.
google.com. 172800 IN      NS      ns1.google.com.
google.com. 172800 IN      NS      ns3.google.com.
google.com. 172800 IN      NS      ns4.google.com.
CK0P0JMO874LJREF7EFN8430QVIT8BSM.com. 86400 IN NSEC3 1 1 0 - CK0Q1G1N43N1ARRC9OSM4QPQR01H5M9A NS SOA RRSIG DNSKEY NSEC3PARAM
CK0P0JMO874LJREF7EFN8430QVIT8BSM.com. 86400 IN RRSIG NSEC3 8 2 86400 202102225054054 20210218043054 58540 com. fe1Hs4C13aSrGLaMsTPf4uEnSzQzZEK0E1o10rB2E8ivtxc0ujuuFlT t86Ht3qZ3+VJRSvewJmzz7Vda5P+
45G0b9l1DH6oM2nK9rSYFNma15g3Q yBuqq09Y4sWE0C7ETiCiL8edScPtvaQe4Z131EYFL++isa+Cr3RjKv/Z 4S1ru8GwK10K9+U2B6YsKvUXI0Vgi/LjHSE9JtcKmo1CnA==
S84BDVKNH5AGDS17F5J003NPRHU0G7JQ.com. 86400 IN NSEC3 1 1 0 - S84BU064GQCvN69RJFU06LVC7FSLUNJ5 NS DS RRSIG
S84BDVKNH5AGDS17F5J003NPRHU0G7JQ.com. 86400 IN RRSIG NSEC3 8 2 86400 20210226053334 20210219042334 58540 com. uW8/NTDAfYcqA4MNQ1Xpvv955SHyeMY170p0Pn4tmVyywZ91+NH2I5+A iVNo1pf3LadhYzAPQvgbFjy0EQTS
9dGpinxCC4ZFXTXUvqoL1ZzVzXs QZ2SwnOH0ECsLap1yO+sJWkStnK1KA/go/4daR3/extP5ynomLjGwXk uRLXj7SV2P9eFMX3cD1lGhezZZCoCo/507zpqXJB19jNEw==
;; Received 840 bytes from 192.55.83.30#53(m.gtld-servers.net) in 24 ms

www.google.com. 300 IN      A      142.250.72.196
;; Received 59 bytes from 216.239.32.10#53(ns1.google.com) in 53 ms

HanMBP:- hanthesuperman$
```

Figure 2: www.google.com using ”dig”

As shown in Figure 2, by typing ”dig www.google.com +trace”, the list of the names of DNS servers in the delegation chain is:

l.root-servers.net

m.gtld-servers.net

ns1.google.com

```

Last login: Sun Feb 21 21:14:41 on ttys000

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
HanMBP:~ hanthesuperman$ dig www.yahoo.com +trace

; <<>> DiG 9.10.6 <<>> www.yahoo.com +trace
;; global options: +cmd
.      477038 IN      NS      d.root-servers.net.
.      477038 IN      NS      e.root-servers.net.
.      477038 IN      NS      f.root-servers.net.
.      477038 IN      NS      g.root-servers.net.
.      477038 IN      NS      h.root-servers.net.
.      477038 IN      NS      a.root-servers.net.
.      477038 IN      NS      i.root-servers.net.
.      477038 IN      NS      j.root-servers.net.
.      477038 IN      NS      k.root-servers.net.
.      477038 IN      NS      l.root-servers.net.
.      477038 IN      NS      m.root-servers.net.
.      477038 IN      NS      b.root-servers.net.
.      477038 IN      NS      c.root-servers.net.
.      477038 IN      RRSIG   NS 8 0 518400 20210306170000 20210221160000 42351 . XnuKeo0a89EQx1BmZGhagMJETHNd05MqwedxSYPKyMDYTlF7KLdHmtof a
7CsyVKmajEFqZ/M8C1m7K+VuXrEg1l1nW4X/OKp043C5 eT/QE0wAAE4pxMHZPrQY+cYq68cyMARc1iL+DJcK8vc3hi4kODt3HW+Z Vxsl/X7cJC6o6Ldqrj0xi58ux97iDpufQnZuU94YR82H/hOY0NNmOv7w
;; Received 1097 bytes from 192.168.1.1#53(192.168.1.1) in 91 ms

com.    172800 IN      NS      a.gtld-servers.net.
com.    172800 IN      NS      b.gtld-servers.net.
com.    172800 IN      NS      c.gtld-servers.net.
com.    172800 IN      NS      d.gtld-servers.net.
com.    172800 IN      NS      e.gtld-servers.net.
com.    172800 IN      NS      f.gtld-servers.net.
com.    172800 IN      NS      g.gtld-servers.net.
com.    172800 IN      NS      h.gtld-servers.net.
com.    172800 IN      NS      i.gtld-servers.net.
com.    172800 IN      NS      j.gtld-servers.net.
com.    172800 IN      NS      k.gtld-servers.net.
com.    172800 IN      NS      l.gtld-servers.net.
com.    172800 IN      NS      m.gtld-servers.net.
com.    86400  IN      DS      30900 8 2 E2D3C916f6DEEAC73294E8268FB5885044A833FC5459588F4A9184CF C41A5766
com.    86400  IN      RRSIG   DS 8 1 86400 20210306170000 20210221160000 42351 . JI+Z/ftJwoljybAxp3n8kDPyWR3RgnP/W1Kzccq8ElLgh9XJ17ei0Ep4i gK
F5WxOqIWhexkIgAyKxrSESGE01lYs+u78j1enso+En6 VsNHifeGnF3xtGhhu9Vh6G4bZ1NOJgJ3+osbnC6z0KaBwqHXTZwaWYwd 8f6H2E9eacOgLNzzYAetYSNryWAHbqBNcm1nAqUjQzd1U13E11bdphm
;; Received 1173 bytes from 198.97.190.53#53(h.root-servers.net) in 36 ms

yahoo.com. 172800 IN      NS      ns1.yahoo.com.
yahoo.com. 172800 IN      NS      ns5.yahoo.com.
yahoo.com. 172800 IN      NS      ns2.yahoo.com.
yahoo.com. 172800 IN      NS      ns3.yahoo.com.
yahoo.com. 172800 IN      NS      ns4.yahoo.com.
CK0PQJMG874LJREF7EFN8430QVIT8BSM.com. 86400 IN NSEC3 1 1 0 - CK0Q1GIN43N1ARRC90SM6QPQR81H5M9A NS SOA RRSIG DNSKEY NSEC3PARAM
CK0PQJMG874LJREF7EFN8430QVIT8BSM.com. 86400 IN RRSIG NSEC3 8 2 86400 20210225054054 20210218043054 58540 com. fe1Hs4C13aSrgLsMsTPf4uEnSZcQzZEKOEl0rB2E8ivtxc
1ru8GWkiOK9+u2B4YsKvUXI0Vgi/ljHSE9JtcKmo1CnA==
GPI0QL0L7VJL2SB4CTA1LU5UTC263MU96.com. 86400 IN NSEC3 1 1 0 - GPI0VE5CC3CA0D1H14G1G1A30835G6EKB NS DS RRSIG
GPI0QL0L7VJL2SB4CTA1LU5UTC263MU96.com. 86400 IN RRSIG NSEC3 8 2 86400 20210225063458 20210218052458 58540 com. dwn0ZAb81RuNTCfrjbsA+ZQxiFmP50QjRPuTals1eZEvwLhM
63q16gdYb0D0WHT+PS+Ocv3Th70AnSMHmSLBeDpspCmA==
;; Received 873 bytes from 192.41.162.30#53(l.gtld-servers.net) in 24 ms

www.yahoo.com. 60 IN CNAME new-fp-shed.wg1.b.yahoo.com.
wg1.b.yahoo.com. 172800 IN NS yf3.a1.b.yahoo.net.
wg1.b.yahoo.com. 172800 IN NS yf4.a1.b.yahoo.net.
wg1.b.yahoo.com. 172800 IN NS yf1.yahoo.com.
wg1.b.yahoo.com. 172800 IN NS yf2.yahoo.com.
;; Received 192 bytes from 68.180.131.16#53(ns1.yahoo.com) in 15 ms

HanMBP:~ hanthesuperman$

```

Figure 3: www.yahoo.com using "dig"

As shown in Figure 3, by typing "dig www.yahoo.com +trace", the list of the names of DNS servers in the delegation chain is:

```

h.root-servers.net
l.gtld-servers.net
ns1.yahoo.com

```

```

The default interactive shell is now zsh.
To update your account to use zsh, please run 'chsh -s /bin/zsh'.
For more details, please visit https://support.apple.com/kb/HT208050.
HanMBP:~ hanthesuperman$ dig www.amazon.com +trace

; <<>> DiG 9.10.6 <<>> www.amazon.com +trace
;; global options: +cmd
.      476847 IN      NS      h.root-servers.net.
.      476847 IN      NS      i.root-servers.net.
.      476847 IN      NS      j.root-servers.net.
.      476847 IN      NS      k.root-servers.net.
.      476847 IN      NS      l.root-servers.net.
.      476847 IN      NS      m.root-servers.net.
.      476847 IN      NS      a.root-servers.net.
.      476847 IN      NS      b.root-servers.net.
.      476847 IN      NS      c.root-servers.net.
.      476847 IN      NS      d.root-servers.net.
.      476847 IN      NS      e.root-servers.net.
.      476847 IN      NS      f.root-servers.net.
.      476847 IN      NS      g.root-servers.net.
.      476847 IN      RRSIG  NS 8 0 518400 20210306170000 20210221160000 42351 . XnuKee0a89EQx1BmZGhagMJETHnd05MqwedxSYPKyMDYTlF7KLdHmtof aDKJ
2SIccPxyS4r3BjvoroU350kwQ49+ancn6zX VoEZ2stfi8y77CsyVKmajEFqZ/M8Clm7K+VuXrEg1l1nW4X/OKpO43C5 eT/QEOwAAE4pxMHZPrQY+cYq68cyMARci1l+DJcK8vc3hi4k0Dt3HW+Z Vxsl/X7cJC6
;; Received 1097 bytes from 192.168.1.1#53(192.168.1.1) in 89 ms

com.    172800 IN      NS      l.gtld-servers.net.
com.    172800 IN      NS      h.gtld-servers.net.
com.    172800 IN      NS      f.gtld-servers.net.
com.    172800 IN      NS      a.gtld-servers.net.
com.    172800 IN      NS      m.gtld-servers.net.
com.    172800 IN      NS      b.gtld-servers.net.
com.    172800 IN      NS      i.gtld-servers.net.
com.    172800 IN      NS      j.gtld-servers.net.
com.    172800 IN      NS      d.gtld-servers.net.
com.    172800 IN      NS      e.gtld-servers.net.
com.    172800 IN      NS      g.gtld-servers.net.
com.    172800 IN      NS      c.gtld-servers.net.
com.    172800 IN      NS      k.gtld-servers.net.
com.    86400 IN      DS      30909 8 2 E2D3C916F6DEEAC73294E8268FB5885044A833FC5459588F4A9184CF C41A5766
com.    86400 IN      RRSIG  DS 8 1 86400 20210306170000 20210221160000 42351 . JI+Z/ftJwoLjybAxp3n8kDPyWR3RgnP/W1Kzcq8E1lGh9XJ17ei0Ep4i gKCWl
uhdG0c2aLjWahChxdWZ29c3zt09zhSQXjr aKrPuewKvJxGF5WxOqIWhexkIgAyKxrSESGE01lYs+u78j1enso+En6 VsNHifeGnF3XtGhu9VH6G4bZ1N0JgJ3+osbnC6z0KaBwqHXTZwaWYwd 8f6H2E9eac0g
;; Received 1174 bytes from 192.33.4.12#53(c.root-servers.net) in 33 ms

amazon.com. 172800 IN      NS      pdns1.ultradns.net.
amazon.com. 172800 IN      NS      pdns6.ultradns.co.uk.
amazon.com. 172800 IN      NS      ns1.p31.dynect.net.
amazon.com. 172800 IN      NS      ns3.p31.dynect.net.
amazon.com. 172800 IN      NS      ns2.p31.dynect.net.
amazon.com. 172800 IN      NS      ns4.p31.dynect.net.
CK0P0JMG874LJREF7EFN8430QVIT8B8M.com. 86400 IN NSEC3 1 1 0 - CK0Q1G1N43N1ARRC90SM6QPQR81H5M9A NS SOA RRSIG DNSKEY NSEC3PARAM
CK0P0JMG874LJREF7EFN8430QVIT8B8M.com. 86400 IN RRSIG NSEC3 8 2 86400 20210225054054 20210218043054 58540 com. fe1Hs4Cl3aSrgLsMsTPf4uEnS2cQzZEK0E1o10rB2E8ivtxc0uj
E0C7ETiCi18EdScpTvaQe4Z131EyFL+isa+Cr3RjKv/Z 4S1ru8Gwk10k9+U2B6YsKvUXI0Vgi/LjHSE9JtcKmo1CnA==
K200LV67UEV5N6PKCVAFB6LH7AOATTMA.com. 86400 IN NSEC3 1 1 0 - K201DAGIUALSSFGADN4DHE7N9Q0IROJ1 NS DS RRSIG
K200LV67UEV5N6PKCVAFB6LH7AOATTMA.com. 86400 IN RRSIG NSEC3 8 2 86400 20210228060926 20210221045926 58540 com. OYF46IiIetvjN8Vp0Gsj1jS+L7647tEAsIzmttBF+3AK2j13FC
Cituqy2PwtL/Mm071/DszXvK7V9qgGcmQwubHvbWpuqfQ hX7f37cbB/vvEkBv5DzASQycCgeV6YVHQR/P/iY1bF1uVA==
;; Received 741 bytes from 192.12.94.30#53(e.gtld-servers.net) in 36 ms

www.amazon.com. 1800 IN      CNAME   tp.47cf2c8c9-frontier.amazon.com.
47cf2c8c9-frontier.amazon.com. 900 IN      NS      ns-1404.awsdns-47.org.
47cf2c8c9-frontier.amazon.com. 900 IN      NS      ns-1881.awsdns-43.co.uk.
47cf2c8c9-frontier.amazon.com. 900 IN      NS      ns-477.awsdns-59.com.
47cf2c8c9-frontier.amazon.com. 900 IN      NS      ns-553.awsdns-05.net.
;; Received 229 bytes from 208.78.71.31#53(ns3.p31.dynect.net) in 16 ms

HanMBP:~ hanthesuperman$

```

Figure 4: www.amazon.com using "dig"

As shown in Figure 4, by typing "dig www.amazon.com +trace", the list of the names of DNS servers in the delegation chain is:

```

c.root-servers.net
e.gtld-servers.net
ns3.p31.dynect.net

```