Alex Shah
EN.695.741.81.SP25 Information Assurance Analysis
Mod 3 Assignment 3
February 10, 2025

1. Provide the domain name, top-level domain, subdomain, and the root domain of this address? (applies to numbers 1 through 6 above).

1. www.wikipedia.org
Domain name: wikipedia
Top level domain: .org
Subdomain: www
Root domain: wikipedia.org

2. www.cnn.com
Domain name: cnn
Top level domain: .com
Subdomain: www
Root domain: cnn.com

3. www.foxnews.com
Domain name: foxnews
Top level domain: .com
Subdomain: www
Root domain: foxnews.com

4. www.aleae.com
Domain name: aleae
Top level domain: .com
Subdomain: www
Root domain: aleae.com

5. www.amazon.com
Domain name: amazon
Top level domain: .com
Subdomain: www
Root domain: amazon.com

6. www.google.com
Domain name: google
Top level domain: .com
Subdomain: www
Root domain: google.com

2. To what CIDR-block does the address's resolved IP address belong and who owns the CIDR-block? (applies to all 1 through 11 above)

1. www.wikipedia.org

% nslookup www.wikipedia.org
www.wikipedia.org canonical name = dyna.wikimedia.org.
Name: dyna.wikimedia.org
Address: 208.80.154.224

% whois 208.80.154.224
NetRange: 208.80.152.0 - 208.80.155.255
CIDR: 208.80.152.0/22
Organization: Wikimedia Foundation Inc. (WIKIM)

2. www.cnn.com

% nslookup www.cnn.com
Server: 192.168.1.1
Address: 192.168.1.1#53

Non-authoritative answer:
www.cnn.com canonical name = cnn-tls.map.fastly.net.
Name: cnn-tls.map.fastly.net
Address: 151.101.3.5
Name: cnn-tls.map.fastly.net
Address: 151.101.67.5
Name: cnn-tls.map.fastly.net
Address: 151.101.131.5
Name: cnn-tls.map.fastly.net
Address: 151.101.195.5

% whois 151.101.3.5
NetRange: 151.101.0.0 - 151.101.255.255
CIDR: 151.101.0.0/16
Organization: Fastly, Inc. (SKYCA-3)

3. www.foxnews.com

% nslookup www.foxnews.com
Server: 192.168.1.1
Address: 192.168.1.1#53

Non-authoritative answer:
www.foxnews.com canonical name = j.sni.global.fastly.net.
Name: j.sni.global.fastly.net
Address: 151.101.66.132
Name: j.sni.global.fastly.net
Address: 151.101.2.132
Name: j.sni.global.fastly.net
Address: 151.101.194.132
Name: j.sni.global.fastly.net
Address: 151.101.130.132

% whois 151.101.66.132
NetRange: 151.101.0.0 - 151.101.255.255
CIDR: 151.101.0.0/16
Organization: Fastly, Inc. (SKYCA-3)

4. www.aleae.com

% nslookup www.aleae.com
Server: 192.168.1.1
Address: 192.168.1.1#53

Non-authoritative answer:
www.aleae.com canonical name = aleae.com.
Name: aleae.com
Address: 216.92.179.155

% whois 216.92.179.155
NetRange: 216.92.0.0 - 216.92.255.255
CIDR: 216.92.0.0/16
Organization: pair Networks (PAIR)

5. www.amazon.com

% nslookup www.amazon.com
Server: 192.168.1.1
Address: 192.168.1.1#53

Non-authoritative answer:
www.amazon.com canonical name = tp.47cf2c8c9-frontier.amazon.com.
tp.47cf2c8c9-frontier.amazon.com canonical name = d3ag4hukkh62yn.cloudfront.net.
Name: d3ag4hukkh62yn.cloudfront.net
Address: 18.164.127.29

% whois 18.164.127.29
NetRange: 18.32.0.0 - 18.255.255.255

CIDR: 18.128.0.0/9, 18.32.0.0/11, 18.64.0.0/10
Organization: Amazon Technologies Inc. (AT-88-Z)

6. www.google.com

% nslookup google.com
Server: 192.168.1.1
Address: 192.168.1.1#53

Non-authoritative answer:
Name: google.com
Address: 142.251.40.206

% whois 142.251.40.206
NetRange: 142.250.0.0 - 142.251.255.255
CIDR: 142.250.0.0/15
Organization: Google LLC (GOGL)

7. 23.55.27.118

% whois 23.55.27.118

NetRange: 23.32.0.0 - 23.67.255.255
CIDR: 23.32.0.0/11, 23.64.0.0/14
Organization: Akamai Technologies, Inc. (AKAMAI)

8. 104.112.42.112

% whois 104.112.42.112

NetRange: 104.64.0.0 - 104.127.255.255
CIDR: 104.64.0.0/10
Organization: Akamai Technologies, Inc. (AKAMAI)

9. 216.58.219.196

% whois 216.58.219.196

NetRange: 216.58.192.0 - 216.58.223.255
CIDR: 216.58.192.0/19
Organization: Google LLC (GOGL)

10. 23.46.57.18

% whois 23.46.57.18

NetRange: 23.32.0.0 - 23.67.255.255
CIDR: 23.64.0.0/14, 23.32.0.0/11
Organization: Akamai Technologies, Inc. (AKAMAI)

11. 128.244.42.5

% whois 128.244.42.5

NetRange: 128.244.0.0 - 128.244.255.255
CIDR: 128.244.0.0/16
Organization: Johns Hopkins University Applied Physics Laboratory (JHUAPL)

3. What is the country of origin for the address? (applies to all 1 through 11 above)

Using https://dnschecker.org/ip-location.php to find the geolocation of the IP addresses

1. www.wikipedia.org
208.80.154.224 is in the US

2. www.cnn.com
151.101.3.5 is in the US

3. www.foxnews.com
151.101.66.132 is in the US

4. www.aleae.com
216.92.179.155 is in the US

5. www.amazon.com
18.164.127.29 is in the US

6. www.google.com
142.251.40.206 is in the US

7. 23.55.27.118
23.55.27.118 is in India

8. 104.112.42.112
104.112.42.112 is in the US

9. 216.58.219.196
216.58.219.196 is in the US

10. 23.46.57.18
23.46.57.18 is in Japan

11. 128.244.42.5
128.244.42.5 is in the US

4. To what Autonomous System does it belong? (applies to all 1 through 11 above)

Using https://bgpview.io/ip to find the ASN for each IP

1. www.wikipedia.org
208.80.154.224 has the ASN AS14907

2. www.cnn.com
151.101.3.5 has the ASN AS54113

3. www.foxnews.com
151.101.66.132 has the ASN AS54113

4. www.aleae.com
216.92.179.155 has the ASN AS7859

5. www.amazon.com
18.164.127.29 has the ASN AS16509

6. www.google.com
142.251.40.206 has the ASN AS15169

7. 23.55.27.118
23.55.27.118 has the ASN AS55836

8. 104.112.42.112
104.112.42.112 has the ASN AS20940

9. 216.58.219.196
216.58.219.196 has the ASN AS15169

10. 23.46.57.18
23.46.57.18 has the ASN AS16625

11. 128.244.42.5
128.244.42.5 has the ASN AS77

5. Run Traceroute and list the path and (latency per hop) from your system to the address? Note: if home router prevents traceroute to run successful against 1 through 11 above, can use on-line traceroute utilities that start from a different router to answer this question. (applies to all 1 through 11 above)

Using https://dnschecker.org/online-traceroute.php to run traceroute

1. www.wikipedia.org
% traceroute 208.80.154.224

```
Start: 2025-02-12T01:47:32+0500
HOST: DNSChecker.org                                          Loss%   Snt   Last   Avg  Best  Wrst
StDev
  1.|-- ???                                                    100.0     3    0.0   0.0   0.0   0.0
0.0
  2.|-- 10.74.132.45                                            0.0%     3    0.5   3.2   0.4   8.8
4.8
  3.|-- 138.197.248.252                                         0.0%     3    0.9   1.0   0.9   1.2
0.2
  4.|-- 143.244.192.164                                         0.0%     3    0.4   0.5   0.3   0.8
0.3
  5.|-- 143.244.225.94                                          0.0%     3    1.1   1.1   0.9   1.2
0.1
  6.|-- 143.244.225.25                                          0.0%     3    0.6   0.7   0.6   0.9
0.2
  7.|-- ae-18.a01.nwrknj03.us.bb.gin.ntt.net (157.238.227.80)  33.3%     3    0.8   0.8   0.8   0.9
0.1
  8.|-- ae-1.r23.nwrknj03.us.bb.gin.ntt.net (129.250.3.24)      0.0%     3    0.9   1.1   0.9   1.3
0.2
  9.|-- ae-10.r24.chcgil09.us.bb.gin.ntt.net (129.250.2.166)    0.0%     3   17.5  17.6  17.5  17.6
0.1
 10.|-- ae-3.a05.chcgil09.us.bb.gin.ntt.net (129.250.4.7)       0.0%     3   17.6  17.7  17.6  18.0
0.2
 11.|-- xe-1-4-3-2.a05.chcgil09.us.ce.gin.ntt.net (192.80.17.198)  0.0%     3   18.0  17.9  17.8  18.0
0.1
 12.|-- xe-4-2-0.cr2-eqiad.wikimedia.org (208.80.154.208)       0.0%     3   22.9  23.4  22.9  24.3
0.8
 13.|-- text-lb.eqiad.wikimedia.org (208.80.154.224)            0.0%     3   21.8  21.8  21.8  22.0
0.1
```

2. www.cnn.com
% traceroute 151.101.3.5

```
Start: 2025-02-12T01:48:22+0500
HOST: DNSChecker.org        Loss%   Snt   Last   Avg  Best  Wrst StDev
  1.|-- ???                 100.0     3    0.0   0.0   0.0   0.0   0.0
  2.|-- 10.74.132.59          0.0%     3    3.0   1.6   0.5   3.0   1.3
  3.|-- 138.197.248.232      66.7%     3    1.4   1.4   1.4   1.4   0.0
  4.|-- 143.244.192.168        0.0%     3    0.4   0.5   0.4   0.8   0.3
  5.|-- ???                 100.0     3    0.0   0.0   0.0   0.0   0.0
  6.|-- 143.244.225.137        0.0%     3    1.1   1.2   0.9   1.5   0.3
  7.|-- ???                 100.0     3    0.0   0.0   0.0   0.0   0.0
  8.|-- 151.101.3.5            0.0%     3    0.8   1.0   0.8   1.2   0.2
```

3. www.foxnews.com
% traceroute 151.101.66.132

```
Start: 2025-02-12T01:49:01+0500
HOST: DNSChecker.org                    Loss%   Snt   Last   Avg  Best  Wrst StDev
  1.|-- ???                              100.0     3    0.0   0.0   0.0   0.0   0.0
  2.|-- 10.74.132.79                       0.0%     3    0.5   4.7   0.5  13.1   7.3
```

```
  3.|-- 138.197.248.254                    66.7%     3    1.3   1.3   1.3   1.3   0.0
  4.|-- 143.244.192.164                     0.0%     3    0.3   0.5   0.3   0.8   0.2
  5.|-- 143.244.225.214                     0.0%     3    1.0   1.4   1.0   2.1   0.6
  6.|-- 143.244.225.143                     0.0%     3    0.7   0.9   0.7   1.5   0.5
  7.|-- fastly-1.nyiix.net (198.32.160.22)  0.0%     3    0.7   0.7   0.7   0.8   0.0
  8.|-- 151.101.66.132                      0.0%     3    1.9   1.2   0.7   1.9   0.6
```

4. www.aleae.com

% traceroute 216.92.179.155

```
Start: 2025-02-12T01:52:01+0500
HOST: DNSChecker.org                                      Loss%   Snt   Last   Avg  Best  Wrst StDev
  1.|-- ???                                               100.0     3    0.0   0.0   0.0   0.0   0.0
  2.|-- 10.74.132.59                                        0.0%     3    0.6   0.9   0.6   1.2   0.3
  3.|-- 138.197.251.12                                     66.7%     3    4.3   4.3   4.3   4.3   0.0
  4.|-- 143.244.192.166                                     0.0%     3    0.4   0.6   0.4   0.8   0.2
  5.|-- 143.244.225.94                                      0.0%     3    1.0   1.0   0.9   1.0   0.0
  6.|-- 143.244.225.25                                      0.0%     3    0.7   0.8   0.7   0.8   0.1
  7.|-- as20326.nyiix.com (198.32.160.82)                   0.0%     3    0.6   0.8   0.6   1.1   0.3
  8.|-- 64.130.60.23                                        0.0%     3    1.6   1.9   1.6   2.1   0.2
  9.|-- po3.er100b-ewr2-bb.teraswitch.com (64.130.60.33)    0.0%     3    6.3   5.3   4.1   6.3   1.1
 10.|-- 100.116.0.6                                         0.0%     3    2.1   2.1   1.9   2.2   0.2
 11.|-- 204.16.241.170                                      0.0%     3   14.0  11.5  10.2  14.0   2.1
 12.|-- cr1.pit1.teraswitch.com (204.16.241.181)            0.0%     3    9.2   9.4   9.2   9.5   0.2
 13.|-- 204.16.243.217                                      0.0%     3    9.9   9.9   9.7  10.0   0.1
 14.|-- 192.168.1.207                                       0.0%     3    9.5   9.7   9.5   9.9   0.2
 15.|-- aleae.com (216.92.179.155)                          0.0%     3   10.5  10.1   9.7  10.5   0.4
```

5. www.amazon.com

% traceroute 18.164.127.29

```
Start: 2025-02-12T01:53:06+0500
HOST: DNSChecker.org                                                Loss%   Snt   Last   Avg  Best  Wrst
StDev
  1.|-- ???                                                         100.0     3    0.0   0.0   0.0
0.0   0.0
  2.|-- 10.74.132.221                                                0.0%     3    0.6   0.8   0.6
1.3   0.4
  3.|-- ???                                                         100.0     3    0.0   0.0   0.0
0.0   0.0
  4.|-- 143.244.192.166                                              0.0%     3    0.3   0.5   0.3
0.6   0.1
  5.|-- 143.244.225.90                                               0.0%     3    0.9   1.0   0.9
1.1   0.1
  6.|-- 143.244.225.19                                               0.0%     3    0.7   0.8   0.6
0.9   0.2
  7.|-- ???                                                         100.0     3    0.0   0.0   0.0
0.0   0.0
  8.|-- ???                                                         100.0     3    0.0   0.0   0.0
0.0   0.0
  9.|-- ???                                                         100.0     3    0.0   0.0   0.0
0.0   0.0
 10.|-- ???                                                         100.0     3    0.0   0.0   0.0
0.0   0.0
 11.|-- ???                                                         100.0     3    0.0   0.0   0.0
0.0   0.0
 12.|-- ???                                                         100.0     3    0.0   0.0   0.0
0.0   0.0
 13.|-- 15.230.208.25                                               0.0%     3    2.9   2.0   1.3
2.9   0.8
 14.|-- server-18-164-127-29.jfk50.r.cloudfront.net (18.164.127.29)  0.0%     3    0.9   1.1   0.9
1.4   0.2
```

6. www.google.com

% traceroute 142.251.40.206

```
Start: 2025-02-12T01:54:54+0500
HOST: DNSChecker.org                          Loss%   Snt   Last   Avg  Best  Wrst StDev
  1.|-- ???                                   100.0     3    0.0   0.0   0.0   0.0   0.0
  2.|-- 10.74.132.195                          0.0%     3    0.6   0.7   0.5   1.1   0.3
  3.|-- 138.197.248.252                        0.0%     3    1.0   1.1   0.9   1.5   0.3
  4.|-- 143.244.192.164                        0.0%     3    0.3   0.4   0.3   0.6   0.1
  5.|-- 143.244.225.90                         0.0%     3    0.7   1.0   0.7   1.2   0.2
```

```
  6.|-- 143.244.225.21                              0.0%     3    0.7   0.7   0.6   0.7   0.0
  7.|-- 146.190.180.25                             0.0%     3    0.7   0.8   0.6   1.0   0.2
  8.|-- 192.178.106.39                             0.0%     3    0.9   1.0   0.9   1.2   0.2
  9.|-- 216.239.40.187                             0.0%     3    0.7   0.8   0.7   1.0   0.2
 10.|-- lga34s38-in-f14.1e100.net (142.251.40.206)  0.0%     3    0.8   1.1   0.8   1.4   0.3
```

7. 23.55.27.118

% traceroute 23.55.27.118

```
Start: 2025-02-12T01:55:29+0500
HOST: DNSChecker.org                                                    Loss%   Snt   Last   Avg  Best
Wrst StDev
  1.|-- ???                                                              100.0     3    0.0   0.0
0.0   0.0   0.0
  2.|-- 10.74.132.69                                                      0.0%     3    0.5   0.9
0.5   1.4   0.4
  3.|-- 138.197.251.12                                                    0.0%     3    1.0   7.0
1.0  18.8  10.3
  4.|-- 143.244.192.174                                                   0.0%     3    0.4   0.5
0.4   0.7   0.2
  5.|-- 143.244.225.92                                                    0.0%     3    0.9   1.0
0.9   1.1   0.1
  6.|-- 143.244.225.19                                                    0.0%     3    0.7   1.2
0.6   2.1   0.9
  7.|-- INFRA1.JIO.COM (206.82.104.162)                                   0.0%     3    1.6   1.6
1.3   1.8   0.3
  8.|-- 103.198.140.28                                                    0.0%     3  196.6 196.7
196.1 197.4   0.6
  9.|-- 103.198.140.40                                                    0.0%     3  193.1 194.0
193.1 195.7   1.5
 10.|-- 103.198.140.28                                                    0.0%     3  196.2 196.1
196.0 196.2   0.1
 11.|-- 103.198.140.177                                                   0.0%     3  195.5 195.9
195.2 197.0   0.9
 12.|-- ???                                                              100.0     3    0.0   0.0
0.0   0.0   0.0
 13.|-- ???                                                              100.0     3    0.0   0.0
0.0   0.0   0.0
 14.|-- 49.44.118.1                                                       0.0%     3  189.0 189.1
189.0 189.3   0.1
 15.|-- a23-55-27-118.deploy.static.akamaitechnologies.com (23.55.27.118)  0.0%     3  188.2 188.4
188.2 188.8   0.3
```

8. 104.112.42.112

% traceroute 104.112.42.112

```
Start: 2025-02-12T01:55:55+0500
HOST: DNSChecker.org                                          Loss%   Snt   Last   Avg  Best  Wrst StDev
  1.|-- ???                                                    100.0     3    0.0   0.0   0.0   0.0
0.0
  2.|-- 10.74.132.69                                            0.0%     3    0.7   0.9   0.6   1.5
0.5
  3.|-- 138.197.248.244                                        33.3%     3    0.9   1.1   0.9   1.3
0.3
  4.|-- 143.244.192.162                                         0.0%     3    0.6   0.8   0.5   1.4
0.5
  5.|-- 143.244.225.90                                          0.0%     3    1.1   1.0   0.9   1.1
0.1
  6.|-- 143.244.225.19                                          0.0%     3    0.6   0.7   0.6   0.7
0.1
  7.|-- ix-ae-21-0.tcore3.njy-newark.as6453.net (66.198.70.38)  0.0%     3    0.6   1.0   0.6   1.1
0.3
  8.|-- if-ae-1-3.tcore4.njy-newark.as6453.net (216.6.57.6)     0.0%     3    0.9   1.5   0.9   2.5
0.8
  9.|-- 66.198.111.67                                           0.0%     3    0.9   0.8   0.8   0.9
0.0
 10.|-- ae2.r01.ewr01.icn.netarch.akamai.com (23.203.154.36)    0.0%     3    0.8   1.0   0.8   1.3
0.3
 11.|-- ???                                                    100.0     3    0.0   0.0   0.0   0.0
0.0
```

9. 216.58.219.196

% traceroute 216.58.219.196

```
Start: 2025-02-12T01:56:34+0500
HOST: DNSChecker.org        Loss%   Snt   Last   Avg  Best  Wrst StDev
  1.|-- ???                 100.0     3    0.0   0.0   0.0   0.0   0.0
  2.|-- 10.74.132.77          0.0%     3    0.7   0.7   0.4   1.1   0.3
  3.|-- 138.197.248.244      66.7%     3    1.3   1.3   1.3   1.3   0.0
  4.|-- 143.244.192.170        0.0%     3    0.4   0.5   0.4   0.8   0.2
  5.|-- 143.244.225.212        0.0%     3    0.9   1.1   0.9   1.2   0.1
  6.|-- 143.244.225.137        0.0%     3    0.8   0.7   0.7   0.8   0.0
  7.|-- 146.190.180.31         0.0%     3    1.3   1.5   1.3   1.7   0.2
  8.|-- 142.251.78.63          0.0%     3    1.4   1.7   1.4   2.2   0.4
  9.|-- ???                   100.0     3    0.0   0.0   0.0   0.0   0.0
```

10. 23.46.57.18

% traceroute 23.46.57.18

```
Start: 2025-02-12T01:57:16+0500
HOST: DNSChecker.org                                                Loss%   Snt   Last   Avg  Best
Wrst StDev
  1.|-- ???                                                          100.0     3    0.0   0.0   0.0
0.0   0.0
  2.|-- 10.74.132.49                                                  0.0%     3    0.6   0.8   0.6
1.2   0.3
  3.|-- 138.197.248.234                                              33.3%     3   21.7  11.4   1.2
21.7  14.5
  4.|-- 143.244.192.168                                               0.0%     3    0.5   0.5   0.4
0.6   0.1
  5.|-- 143.244.225.96                                                0.0%     3    0.9   1.0   0.9
1.0   0.0
  6.|-- 143.244.225.23                                                0.0%     3    0.7   0.7   0.6
0.7   0.0
  7.|-- ae-8.a00.nwrknj03.us.bb.gin.ntt.net (157.238.227.60)          0.0%     3    0.8   6.3   0.8
10.8   5.1
  8.|-- ae-3.r22.nwrknj03.us.bb.gin.ntt.net (129.250.3.176)           0.0%     3    0.8   1.0   0.8
1.3   0.3
  9.|-- ae-4.r26.sttlwa01.us.bb.gin.ntt.net (129.250.6.177)           0.0%     3   61.5  61.6  61.5
61.6   0.0
 10.|-- ae-9.r32.tokyjp05.jp.bb.gin.ntt.net (129.250.4.143)          66.7%     3  160.2 160.2 160.2
160.2   0.0
 11.|-- ae-0.a03.tokyjp05.jp.bb.gin.ntt.net (129.250.5.92)           0.0%     3  157.6 157.3 157.1
157.6   0.3
 12.|-- ae-3.akamai.tokyjp05.jp.bb.gin.ntt.net (61.120.147.146)      0.0%     3  801.5 628.0 512.4
801.5 152.9
 13.|-- lo1.r03.stem01.tyo02.fab.netarch.akamai.com (23.201.30.22)   0.0%     3  170.4 170.4 170.3
170.5   0.1
 14.|-- lo1.r03.spine03.tyo02.fab.netarch.akamai.com (23.201.30.14)  0.0%     3  170.2 170.3 170.2
170.3   0.1
 15.|-- lo1.r03.leaf01.tyo02.fab.netarch.akamai.com (23.201.30.26)   0.0%     3  169.0 169.1 169.0
169.2   0.1
 16.|-- vlan100.r09.tor01.tyo02.fab.netarch.akamai.com (23.217.102.97)   0.0%     3  170.4 170.4 170.4
170.4   0.0
 17.|-- a23-46-57-18.deploy.static.akamaitechnologies.com (23.46.57.18)  0.0%     3  165.7 165.7 165.7
165.9   0.1
```

11. 128.244.42.5

% traceroute 128.244.42.5

```
Start: 2025-02-12T01:57:42+0500
HOST: DNSChecker.org                                              Loss%   Snt   Last
Avg  Best  Wrst StDev
  1.|-- ???                                                        100.0     3    0.0
0.0   0.0   0.0   0.0
  2.|-- 10.74.132.77                                                0.0%     3    0.7
0.9   0.5   1.6   0.6
  3.|-- 138.197.251.12                                             66.7%     3    1.4
1.4   1.4   1.4   0.0
  4.|-- 143.244.192.166                                             0.0%     3    0.3
0.6   0.3   1.0   0.4
  5.|-- 143.244.225.90                                              0.0%     3    1.0
1.0   1.0   1.0   0.0
```

```
  6.|-- 143.244.225.21                                                    0.0%     3    0.6
0.7   0.6   0.9   0.2
  7.|-- 10gigabitethernet1-2.core1.nyc6.he.net (198.32.160.61)           66.7%     3    1.9
1.9   1.9   1.9   0.0
  8.|-- port-channel7.core2.nyc5.he.net (72.52.92.102)                   66.7%     3    2.0
2.0   2.0   2.0   0.0
  9.|-- port-channel24.core3.ash1.he.net (184.104.189.84)                 0.0%     3    7.5
7.6   6.8   8.4   0.8
 10.|-- johns-hopkins-applied-physics-lab.e0-7.switch2.ash1.he.net (209.51.181.30)  0.0%     3    7.6
7.5   7.3   7.6   0.1
 11.|-- 128.244.42.5                                                     0.0%     3    8.0
7.7   7.3   8.0   0.3
```

6. For IP addresses only, what DNS FQDNs are associated with the IP address? (Can use reverse DNS lookup/resolution) (only applies to 7 through 11 above)

Using https://dnschecker.org/reverse-dns.php to find the hostname from IP

7. 23.55.27.118
resolves to a23-55-27-118.deploy.static.akamaitechnologies.com

8. 104.112.42.112
resolves to a104-112-42-112.deploy.static.akamaitechnologies.com

9. 216.58.219.196
resolves to lga25s40-in-f4.1e100.net

10. 23.46.57.18
resolves to a23-46-57-18.deploy.static.akamaitechnologies.com

11. 128.244.42.5
does not resolve to a hostname

7. Why might Boarder Gateway Protocol (BGP) sometimes be preferred over Open Shortest Path First (OSPF)? Support your answer.

OSPF is less suited for large scale network applications like routing on the Internet between ASes, since OSPF uses the shortest path algorithm with a full map of the network to find the optimal route. This isn't always available on large scales and can be resource intensive to compute at scale whereas BGP can use customized routing policies for flexibility and control. OSPF is preferred for intra network routing such as within an AS where the network database is built up from the routers communicating their link states in order to calculate an optimum path. BGP is often used to route between ASes where the network is large, complex, and dynamic and the flow of data needs to be considered more carefully with policies.

8. Discuss eight (8) differences between BGP and OSPF. (i..e, Implementation, Convergence, Design, Size of the network, Function, Algorithm, Protocol, Type, etc.)

In the implementation of BGP and OSPF, there are different factors to determine the best pathway to route traffic. BGP uses a combination of factors like weight of a link, local preference factors, and distance and other metrics. OSPF uses the bandwidth and known or learned tables describing the network to find the lowest pathway cost. BGP routes consider these different factors or custom policies can be used to make further rules or manual routes as required. This makes BGP more complex, but in large scales like Internet routing it becomes necessary to granularly define traffic routes. OSPF is simpler in calculating routes based on cost/metrics for bandwidth and delay, and can be more autonomous, especially on the smaller scales it typically operated on. BGP is considered an external routing protocol between ASes, whereas OSPF is considered an internal routing protocol for routing traffic locally such as within an AS. BGP is a path vector protocol where each router has a list of sequences of ASes for routing to a destination, compared to OSPF in which routers advertise their link states to each other in order for each router to build a map of the network. OSPF converges faster than BGP because link state changes are advertised quickly, whereas BGP path traversal lists are updated more slowly. This makes OSPF quick and efficient at smaller scales compared to the large scales that BGP is typically used for. And BGP routers only know about the best route to a destination, whereas OSPF routers must build up a total map of the network by receiving information about all the link states. At large scales this becomes much more difficult. BGP routers store path lists made up of ASes, and if that list contains itself it rejects the path to avoid forming a loop. OSPF uses sequence numbers and acknowledgements so that router advertisements are kept up to date when forming topology in order to prevent loops when calculating optimum paths.

9. Explain what CIDR Classful and Classless addresses are & when you would use both?

Classful addressing divides IP address spaces up into predetermined chunks or classes with a chosen IP address range and bitmask for each class, such as a class A network being given out in blocks of millions of addressable IPs, then class B with tens of thousands, and so on determined by the bitmask for the class. Some ranges are marked for certain uses such as class D for multicast and E is reserved for future use. This led to wasteful problems like assigning more IP addresses than needed, or problems needing to assign multiple networks to get the right number of addresses which becomes complex to route to. Classless addresses are a replacement to classful addressing to fix these issues and allocate IP addresses with variable length masks that don’t have follow the classful predetermined range and bitmask. This lets address ranges be divided up based on how many addresses a network needs, which is more flexible and less wasteful. Classless Inter Domain Routing can route between different legnth subnets or combine routes into fewer routing table entries, making it more capable for large routing environments. The older classful addressing would be used in legacy applications or when the predetermined division of the network is useful such as for easier troubleshooting.

Sources:

https://netseccloud.com/bgp-vs-ospf-understanding-the-differences-in-routing-protocols#Basics_of_BGP_and_OSPF

https://www.techtarget.com/searchnetworking/tip/BGP-vs-OSPF-When-to-use-each-protocol

https://www.geeksforgeeks.org/difference-between-ospf-and-bgp/

https://www.catchpoint.com/dynamic-routing-protocols/bgp-vs-ospf

https://www.geeksforgeeks.org/classful-vs-classless-addressing/

https://aws.amazon.com/what-is/cidr/

Sites Used:

bgpview.io

dnschecker.org