1. Number of probes per ttl:

   group1 : 3 probes per ttl
   group2 : 3 probes per ttl

2.

   In group 1:
      intermediate routers 1-12 are the same for each of the 5 traces. Router 13 is different across traces.
      In particular the differences are likely due to load balancing, where routers distribute traffic across multiple
      paths to optimize performance and reliability. This is evident from the variation in IP addresses at the router 13,
      as modern networks often use dynamic routing protocols and Anycast to manage traffic.
      These variations reflect the network's design congestion.

   In group 2:
      the intermediate routers match exactly for each trace

   here is the data I used to inform my answers above

   grep -E 'router 13|group1' full_test.txt:

      PcapTracesAssignment3/group1-trace1.pcap
            router 13: 209.85.250.121
            router 13: 209.85.249.153
            router 13: 209.85.249.155
      PcapTracesAssignment3/group1-trace2.pcap
            router 13: 209.85.250.57
            router 13: 209.85.249.109
            router 13: 209.85.246.219
      PcapTracesAssignment3/group1-trace3.pcap
            router 13: 209.85.249.155
            router 13: 209.85.247.63
            router 13: 209.85.245.65
      PcapTracesAssignment3/group1-trace4.pcap
            router 13: 209.85.250.123
            router 13: 209.85.246.219
            router 13: 209.85.245.65
      PcapTracesAssignment3/group1-trace5.pcap
            router 13: 209.85.249.153
            router 13: 209.85.247.61

router 13: 209.85.250.59

grep -E 'router 13|group2' full_test.txt:

PcapTracesAssignment3/group2-trace1.pcap
router 1: 192.168.0.1
router 2: 24.108.0.1
router 3: 64.59.161.197
router 4: 66.163.72.26
router 5: 66.163.68.18
router 6: 72.14.221.102
router 7: 108.170.245.113
router 8: 209.85.249.249
PcapTracesAssignment3/group2-trace2.pcap
router 1: 192.168.0.1
router 2: 24.108.0.1
router 3: 64.59.161.197
router 4: 66.163.72.26
router 5: 66.163.68.18
router 6: 72.14.221.102
router 7: 108.170.245.113
router 8: 209.85.249.249
PcapTracesAssignment3/group2-trace3.pcap
router 1: 192.168.0.1
router 2: 24.108.0.1
router 3: 64.59.161.197
router 4: 66.163.72.26
router 5: 66.163.68.18
router 6: 72.14.221.102
router 7: 108.170.245.113
router 8: 209.85.249.249
PcapTracesAssignment3/group2-trace4.pcap
router 1: 192.168.0.1
router 2: 24.108.0.1
router 3: 64.59.161.197
router 4: 66.163.72.26
router 5: 66.163.68.18
router 6: 72.14.221.102
router 7: 108.170.245.113
router 8: 209.85.249.249
PcapTracesAssignment3/group2-trace5.pcap
router 1: 192.168.0.1

router 2: 24.108.0.1
router 3: 64.59.161.197
router 4: 66.163.72.26
router 5: 66.163.68.18
router 6: 72.14.221.102
router 7: 108.170.245.113
router 8: 209.85.249.249

3.

In group1, The 8th hop (TTL 8) is likely to incur the maximum delay.
This is evidenced by the unusually high delay value (50.242) in group1 trace2
This significant increase suggests there might be a network bottleneck or congestion

In group 2 the second hop likely incurs the most delay as there's a large difference between the RTT
at hop count 1 vs 2.

	1	2	3	4	5	6	7	8	9	10	11	12	13
group1 trace1	11.366667	16.850667	16.008667	17.562	18.361	11.861333	13.507333	14.095667	18.234333	16.911667	19.429	14.697	19.620333333333335
group1 trace2	11.385	15.933	15.450333	17.711667	16.878	11.641	13.429333	50.242	16.794667	17.578	19.223333	15.6222	18.018666666666668
group1 trace3	11.686	15.732333	16.314333	17.158	17.914667	12.113333	14.406	15.182333	18.085667	18.865	20.102667	12.7695	20.839666666666666
group1 trace4	11.214	15.712667	15.420667	16.688667	17.442667	11.519333	13.587667	14.006333	16.930667	18.181	19.434	13.9400	19.775333333333332
group1 trace5	11.298333	16.691333	17.484333	18.246667	19.010333	11.917667	13.539	18.522333	16.708333	17.964667	19.327333	13.892	19.634666666666664
group2 trace1	3.329667	15.811667	18.869333	22.843	26.502	24.263667	18.408	22.970667					
group2 trace2	2.710667	17.118333	20.096667	19.42	21.555333	19.982333	51.658	-224.262333					
group2 trace3	7.854	11.835333	22.579333	19.460333	20.321333	21.849667	22.763333	20.592					
group2 trace4	3.415333	13.245	21.672333	19.754667	35.771333	22.674667	18.337333	24.574333					

group2 trace5 1.745667 16.153667 21.601667 18.558333 20.717 43.472 26.921333 25.623333