1. *How many ICMP echo requests did traceroute send? How does the TTL fields of these packets change?*

   There are 28 ICMP echo requests that traceroute sent. The TTL field of the first 27 of the ICMP requests are 1,2,3, …. , 27(increasing 1 in each ICMP echo requests). The TTL field of the last ICMP echo request is 64.

2. *What are the numbers and source IP addresses of TTL-exceeded responses (if any)? Compare them with the output of the traceroute command.*

Number	Source IP Addresses
23	144.122.84.1
24	144.122.2.1
26	193.140.85.137
35	46.234.28.57
37	31.145.74.162
39	195.2.23.129
41	144.122.1.21
53	195.2.27.149
59	195.2.16.1
67	23.235.41.162

   Although there are 11 TTL-exceeded responses, there are 12 entries in the output of the traceroute command. The last entry of the traceroute command output does not have a corresponding TTL exceeded response. The IP address of this entry is 151.101.194.167.

3. *Can you explain how traceroute found out the route to destination? Is this route always the same assuming you run traceroute from same location/network? Explain briefly.*

   Traceroute starts to sending packets with TTL value(Time to Live). This value is 1 in the first step and then it is 2 in the second step and it goes like this. This TTL value specifies how many hops that the packet can survive before it is returned. When returned packet is reached the initiating machine, it analyzes the returned packet in order to determine where this packet coming from. By gradually increasing the TTL value and investigating the returned packet, traceroute can find out the route.

   No, the route is not always the same since there are different routers on the route. Other routers can be used in other trials. The routing tables and load balancing factors may cause this change in the route.

4. *What is the IP header length and total packet length of the DNS query response with type A record for hbostann.com? (If no dns requests are made for hbostann.com please flush your dns cache and try again)*

   DNS query response is on number 93. IP header length is 20 bytes and total packet length is 74 bytes.

5. *What is the value of Protocol field in IP header for UDP communication and for ICMP communication?*

   The value is 17 for UDP and 1 for ICMP.

6. *In the ping request you made to hbostann.com, has the IP datagram been fragmented? If so, how many fragments are used and why?*

   Yes. In the ping request, IP datagram has been fragmented and there are 4 fragments. Since maximum transmission unit (MTU) is 1500 byte and sending data is more than this, it should be fragmented.