WSA 3

1) 13 echo requests are sent by Traceroute in total, TTL starts at 1 and gets increased by 1 after each time Time to Live exceeded in transit has been encountered without a response, at TTL=13 we finally have a response from our target(151.101.242.167).

2)Packet No's are 17,21,25,29,35,39,43,47,51,55
As expected , source IP's of TTL-exceeded responses are the same as output from the traceroute before the line with *,

Output of Traceroute
traceroute to twitch.map.fastly.net (151.101.242.167), 64 hops max, 72 byte packets

```
 1  144.122.66.1 (144.122.66.1)  3.469 ms
 2  rt1.metu.edu.tr (144.122.2.1)  2.590 ms
 3  144.122.1.21 (144.122.1.21)  19.042 ms
 4  193.140.85.137 (193.140.85.137)  4.104 ms
 5  213.194.75.25 (213.194.75.25)  10.626 ms
 6  31.145.74.162 (31.145.74.162)  10.248 ms
 7  46.234.28.57 (46.234.28.57)  10.055 ms
 8  ae4-17-ucr1.tuz.cw.net (195.2.23.129)  10.293 ms
 9  ae5-xcr1.sof.cw.net (195.2.27.149)  35.583 ms
10  ae50.0-xcr1.mlu.cw.net (195.2.16.1)  46.085 ms
11  *
12  *
13  151.101.242.167 (151.101.242.167)  47.920 ms
```

3- Traceroute uses the fact that each router along the route will decrease the TTL value embedded in IP datagram by 1. As TTL value hits 0 at a router, it will generate ICMP TTL exceeded error and send it back to sender. We can exploit this fact by sending icmp messages with increasing ttl values, we get to know which machines are between us and the destination . No , route is not always same, as the network traffic between source and destination can be effected by momentary changes, packet route depends on the current state of traffic.

4)Header length = 20, total length = 74

5) UDP communication 17, ICMP communication 1

6) Yes , IP datagram has been fragmented into 3 pieces(90,91,92) , and reassembled in packet 93. This fragmentation is due to the fact that a link's MTU(Maximum Transmission Unit) on the route is smaller than the sent packet.