1. How to create a payload with padding for ICMP reply packets?

- Create a byte array and initialize with 0's. Then, leave the 1st 4 bytes of the array and fill in the other required data as specified in the assignment description.

2. While running the traceroute command, we are getting the following error: "traceroute: command not found"?

- You will have to install traceroute utility in your VM.
  `sudo apt-get install traceroute`

3. Should we send the entire vector while sending RIP update messages?

- Yes, include the entire distance vector while sending RIP update messages.

4. Do we need to implement poison reverse/split horizon/handling count to infinity issue in Distance Vector?

- No, you need to implement just the basic distance vector routing.

5. Traceroute utility does not have -n option?

- You have an older version of traceroute, please remove the older version and install the one as mentioned in Q2.
  `sudo apt-get remove inetutils-traceroute`

6. Should we send an ICMP reply packet for another failed ICMP packet?

- It is highly unlikely that ICMP packets will be failing since TTL will be set to 64. However, we could encounter rare scenarios where the ICMP packets are getting corrupted resulting in checksum matching failure. For this assignment, you can ignore such cases.

7. How to find the size of the IP header for correct copying of it to the ICMP reply?

- The size field in the IP header is the length of the IP header in 4-byte words. To get the length of the IP header in bytes, multiple it by 4.
- You can refer to Lab 2 description which has details(Part 3 - Checking Packets section)

8. For testing "Destination Host unreachable", we tried removing entries from rtable. But, the routers are regenerating the entries. How should we test this?

- Every time you start mininet, it generates rtable files for the topology. So, to test this scenario, after you start mininet and before starting your router, you should remove a line from any rtable file.

9. What should be the TTL for RIP packets?

- Set the TTL for TIP to 15.

10. In traceroute, intermediate router are not getting listed. How to debug the issue?

- One main reason is that the ICMP reply packet is not constructed properly. Also, you might be missing FAQ 7.

11. How to find directly reachable subnets in a router?

- Each router's interface has an IP address and a subnet mask. The associated subnet can be found using these. Directly reachable subnets are subnets that these interfaces are part of.

12. First packet is always dropped while testing without using -a flag in mininet. What is the issue? How to solve it?

- This is a corner case which you need to handle. Consider a startup phase where the arpTable is empty, and you do `h1 ping -c 10.0.5.167. 10.0.5.167` is non-existing network IP. This will make the route table entry lookup return null, requiring an ICMP reply. But, while filling the destination MAC address for h1, since the arpTable is not populated, will result in NULL lookup result again. In this case, you need to trigger an ARP request for h1 again.

13. What corresponds to the IP Address in the Route Table entry?

- The IP Address in the Route Table entry is the Subnet number from the IP Address of interface & Subnet Mask of interface.

14. While initializing the route entry before running RIP, all the router interfaces are empty. Why?

- This could happen when you are trying to load the route table entries at the wrong point of the code. Router has a function called `loadTable`, which is called from `Main.java` after the router has been successfully initialized. As mentioned in the lab, modify the call in the Main class to load from router interfaces, if the "`-r`" option is not specified.