Homework 1

This HW assignment is a mainly a review of the fundamentals of computer networks. You may have to use resources other than your main course textbook (online or printed) to answer some of the questions here

1. List the main differences between the ISO OSI and the TCP/IP reference models.

2. Explain the Classless InterDomain Routing (CIDR) addressing scheme with respect to the following: (Use an example or an illustration if you can).
   a. How are addresses (and masks) assigned and grouped (aggregated)?
   b. How are routes advertised to other networks.
   c. How does a router look up a route, once it receives a packet.

3. Explain: what are private IP addresses? List all the private IP address ranges that are in use in IPv4 and their classes (A, B and C). Include auto-configured private addresses in your answer.

4. What is network address translation (NAT), and why and how is it used? Be sure to explain the different types of NATs in use.

5. a.
   Use the `wireshark` packet analyzer to capture a trace of the traffic sent by your browser of choice to University of Oxford's website: `www.ox.ac.uk`. Clearly explain the sequence of events (DNS exchange, ARP, TCP Connection Setup, Web page request, TCP Connection Teardown, etc.) that takes place to transfer the requested web page. Use a highlighter wherever needed to clearly mark the sections of data packet traffic and provide a corresponding explanation as to what that part does.

   b.
   Use `traceroute` or `tcptraceroute` to find the distance of the destination mentioned in part *a* in terms of hop-count, and round trip time (RTT) latency experienced by packets. Also, *make a reasoned **guess*** as to which of the routers are on the Internet backbone?