

## Computer Networking

### Homework#4

1. (a) How many bytes are there in the header field of a typical IPv4 datagram without optional header field?  
(b) What is the purpose of the time-to-live (TTL) field in the header of a IPv4 datagram? How does this field function when a IPv4 datagram is processed by a router?
2. Consider a router that interconnects three subnets: Subnet 1, Subnet 2, and Subnet 3. Suppose all of the interfaces in each of these three subnets are required to have the prefix 223.3.16.0/24. Also suppose that Subnet 1 is required to support up to 120 interfaces, and Subnets 2 and 3 are each required to support up to 50 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints.
3. What is a private network address? Should a datagram with a private network address ever be present in the larger public Internet, why or why not?
4. (a) Explain the **tunneling** technique used for the IPv4-to-IPv6 transition. (b) Do you agree with the following statement: when IPv6 tunnels through IPv4 router, IPv6 treats the IPv4 tunnels a link-layer protocols?
5. What is the meaning of “match plus action” operation of a router or switch? In the case of destination-based forwarding packet switch, what is matched and what is the action taken? In the case of an SDN, name 2 fields that can be matched and 2 actions that can be taken.