**CSC 335 Data Communication and Networks**

**Homework 4**

1. (1 point) Determine the IP address assigned to your home computer. (use ipconfig on Windows machine or Network Utility on a MAC).

My local IP address: 192.168.1.217

My public IP address: 100.14.112.250

(2 points) Find the IP addresses of the following web sites. Use nslookup from a command prompt. What is the network ID?

* 1. [www.cs.wcupa.edu](http://www.cs.wcupa.edu) - v4: 144.26.62.132, v6: 2605:0:103:200:144:26:62:132
  2. [www.csc.villanova.edu](http://www.csc.villanova.edu) - v4: 153.104.202.74
  3. [www.cs.swarthmore.edu](http://www.cs.swarthmore.edu) - v4: 130.58.68.137

A network ID is 1-3 octets (depending on the class) of an IP address that direct packets to a specific network, which allows for routers to retain less IP addresses to compare against when routing packets – they only need to know the correct network to send it the packets to instead of all the various hosts within that network.

1. (1 point) What is a subnet and what is a subnet mask? Can 255.255.253.0 be a subnet mask? Why or why not?

A subnet is just a further division of a network into smaller networks for the purpose of making routing easier to handle by routers. A subnet mask is a 32-bit number that tells a router how to separate the network ID, subnet ID, and host ID. 255.255.253.0 cannot be a subnet mask because to be a subnet mask, it must be a bunch of consecutive 1s followed by consecutive 0s, but the number 253 in binary is 1111 1101, which breaks the consecutive 1s rule of subnet masks.

1. (1 point) What are the disadvantages of using IP address classes? How does CIDR overcome these disadvantages?

Using IP address classes has the potential to waste a lot of IP addresses. If a business only needs 20 IP addresses, even a class C IP address will give the business 256 IP addresses (which is way more than 20!). CIDR overcomes this by dividing an IP addresses into categorized “masks,” which dictate the length of the subnet address and the length of the host address. Using this method, you can purchase a subnet that spans just 1, 2, 4, 8, 16, or any power of 2 (up to 32) IP addresses. This much more effectively splits up the size of networks and their subnets.

1. (1 point) What is the purpose of the TTL field in IP packets?

The time to live field in IP packets dictates how many hops between routers a packet can accept before being dropped to prevent situations where an undeliverable datagram circulates on an internet system indefinitely.

1. (1 point) What is IPv6. Please explain the structure of IPv6 packet header.

IPv6 is just a new form of IP addressing that allows for more addresses since it has 8 slots of 16-bit numbers, instead of IPv4’s 4 slots of 8-bit numbers. Where an IPv4 packet (without options) header has a size of 20 octets, the size of an IPv6 packet header is 40 octets. Within the IPv6 packet header there is an IP version definer, a traffic class to specify it’s priority/reliability, a flow label to specify if a packet is a part of a group of packets, TCP session or media stream, the payload length, the type of the next header, and the hop limit (which replaces the Time To Live field in IPv4). Also included in the IPv6 header are the source and destination addresses.

Also note – after watching the videos, the only thing I think I heard about IPv6 was that the version 4-bits of the packet header define whether the packet is of IPv4 or IPv6, and that the Time To Live is similar to a hop limit, so I looked up more information on tutorialspoint and Wikipedia for more information.