

CS 146, Homework 1: Networking

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Pledge:

I pledge My Honor That I have abided by  
The Stevens Honor System. *[Signature]*

Each correct answer is worth 10 points.

1. At which layer of the OSI model does the routing between source and destination happen?

Layer 3, <sup>the</sup> Network layer

2. Assume that we are using classful addressing. What class of network would the IP address 125.168.12.9 fall into?

A

3. What was the primary issue that led to the abandonment of classful addressing?

Lack of internal Address Flexibility

4. Given the CIDR notation /24, what would be the equivalent subnet mask in dotted decimal notation?

255.255.255.0

5. What is the main reason IPv6 was invented? How does it solve this problem?

The main reason IPv6 was created was because IPv4 did not provide enough addresses. It solves the issue by using 128-bit addresses.

6. Rewrite the IPv4 address 162.119.33.150 as an IPv6 address. You may use the shortcut mentioned in the slides.

2002:A277:2196::A277:2196

For 5 points of extra credit, rewrite the same address in full-hexadecimal IPv6 format.

A2772196

7. Given the address 173.67.115.109, what is the address of the network itself in dotted decimal notation?

*[scribble]* 173.67.0.0

8. Given the same address 173.67.115.109 as above, what is the broadcast address in dotted decimal notation?

255.255.115.109

9. How many valid subnets and hosts per subnet can exist on the network specification 172.27.156.41/30?

4, 144, 300 subnets  
6 hosts per subnet

10. What is the dotted decimal and binary form of your computer's 'localhost' address?

127.0.0.1

01111111.00000000.00000000.00000001

6) IPv4 to IPv6: 2002:ab::cd::ab::cd

162.119.33.150

$$\frac{162}{16}$$

$$\frac{119}{16}$$

$$\frac{33}{16}$$

$$\frac{150}{16}$$

10 R2

7 R7

2 R1

9 R6

A277: 2196 = Hex

2002: A277: 2196:: A277: 2196 = Full

7) 173.67.115.109

(w/d)

Binary: 1011101.1000011.1110011.1101101

$$\frac{173}{2} = 86 \text{ R1}$$

$$\frac{67}{2} = 33 \text{ R1} \cdot \frac{115}{2} = 57 \text{ R1}$$

$$\frac{109}{2} = 54 \text{ R1}$$

$$\frac{86}{2} = 43 \text{ R0}$$

$$\frac{33}{2} = 16 \text{ R1}$$

$$\frac{57}{2} = 28 \text{ R1} \cdot \frac{54}{2} = 27 \text{ R0}$$

$$\frac{43}{2} = 21 \text{ R1}$$

$$\frac{16}{2} = 8 \text{ R0}$$

$$\frac{28}{2} = 14 \text{ R0}$$

$$\frac{27}{2} = 13 \text{ R1}$$

$$\frac{21}{2} = 10 \text{ R1}$$

$$\frac{8}{2} = 4 \text{ R0}$$

$$\frac{14}{2} = 7 \text{ R0}$$

$$\frac{13}{2} = 6 \text{ R1}$$

$$\frac{10}{2} = 5 \text{ R0}$$

$$\frac{4}{2} = 2 \text{ R0}$$

$$\frac{7}{2} = 3 \text{ R1}$$

$$\frac{6}{2} = 3 \text{ R0}$$

$$\frac{5}{2} = 2 \text{ R1}$$

$$\frac{2}{2} = 1 \text{ R0}$$

$$\frac{3}{2} = 1 \text{ R1}$$

$$\frac{3}{2} = 1 \text{ R1}$$

$$\frac{2}{2} = 1 \text{ R0}$$

$$\frac{1}{2} = 0 \text{ R1}$$

$$\frac{1}{2} = 0 \text{ R1}$$

$$\frac{1}{2} = 0 \text{ R1}$$

$$\frac{1}{2} = 0 \text{ R1}$$



Default Subnet Mask: 255.255.0.0

Binary: 11111111.11111111.00000000.00000000

$$\frac{255}{2} = 127 \text{ R } 1$$

$$\frac{127}{2} = 63 \text{ R } 1$$

$$\frac{63}{2} = 31 \text{ R } 1$$

$$\frac{31}{2} = 15 \text{ R } 1$$

$$\frac{15}{2} = 7 \text{ R } 1$$

$$\frac{7}{2} = 3 \text{ R } 1$$

$$\frac{3}{2} = 1 \text{ R } 1$$

$$\frac{1}{2} = 0 \text{ R } 1$$

Bit wise AND

1011101.1000011.1110011.11011011  
1111111.1111111.00000000.00000000

=

1011101.1000011.00000000.00000000 = Network

1111111.1111111.1110011.11011011 = Broadcast  
255.255.15.69

Bitwise  
or

$$\frac{126}{2} = 63 \text{ RO}$$

9.

$$130 = .252$$

Default Subnet = 255.0.0.0

22 b.pts - beyond

Number of Subnets =  $2^{22} = 4,194,304$  subnets

### 3. unbound

$2^3 - 2$  8-2 6 hosts per subnet