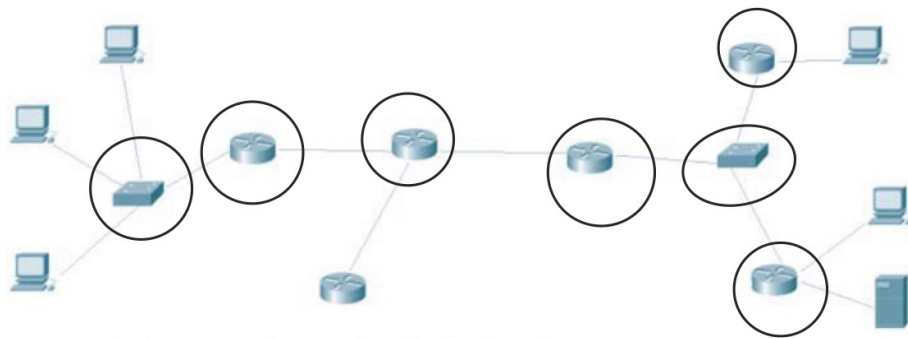


5)



Determine how many subnets are found in the above given network:

- a) 7
- b) 9
- c) 5
- d) 11

10) What is the maximum number of hosts for a class C network?

- a) 65.534
- b) 65.535
- c) 128
- d) 254

for C mask is 255.255.255.0 $\Rightarrow 2^8 - 2 = 256 - 2 = 254$

18) Which of the following are valid IP addresses to mark a sub network?

- a) 177.91.107.144/29
- b) 177.91.107.0/32
- c) 177.91.107.1/25
- d) 177.91.154/30

$32 - 29 = 3 \Rightarrow 2^3 = 8 \Rightarrow 144 / 8 = 18 \Rightarrow$ valid subnet

$32 - 25 = 7 \Rightarrow 2^7 = 128 \Rightarrow 1 / 128 = 0,006 \Rightarrow$ invalid subnet

19) What is the range of network IPs in which the following given IP resides: 194.168.19.65/28?

- a) 194.168.19.64 – 194.168.19.87
- b) 194.168.19.64 – 194.168.19.79
- c) 194.167.19.62 – 194.167.19.87
- d) 194.168.19.0 – 194.168.19.64

$$65 = 2^6 + 2^0$$

$$32 - 28 = 4 \Rightarrow 4 \text{ zero}$$

0100 0001 AND

1111 0000

0100 0000 $\Rightarrow 64$

0100 0001 OR

0000 1111

0100 1111 $\Rightarrow 79$

20) Which of the following is the correct host range for the subnet in which we can find the IP address

192.168.168.188 255.255.255.192?

- a) 192.168.168.129 – 191
- b) 192.168.168.128 – 190
- c) 192.168.168.128 – 192
- d) 192.168.168.129 – 190

$$188 = 2^7 + 2^5 + 2^4 + 2^3 + 2^2$$

$$192 = 2^7 + 2^6$$

1011 1100 AND

1100 0000

1000 0000 $\Rightarrow 128$

1011 1100 OR

0011 1111

1011 1111 $\Rightarrow 191$

33) Which of the following is true about the IP address 10.16.3.65/23?

- a) The subnet address is 10.16.3.0 255.255.254.0
- b) The last valid host address in the subnet is 10.16.2.254 255.255.254.0
- c) The broadcast address of the subnet is 10.16.3.0 255.255.254.0
- ☒ d) The lowest host address in the subnet is 10.16.2.1 255.255.254.0

$$32 - 23 = 9 \Rightarrow 255.255.254.0$$

$$0000 \ 0011 \ . \ 0100 \ 0001$$

$$1111 \ 1110 \ . \ 0000 \ 0000$$

$$0000 \ 0010 \ . \ 0000 \ 0000 \Rightarrow 2.0 \Rightarrow \text{lowest host is } NA + 1 \Rightarrow 2.1$$

35) What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask?

- a) 14
- b) 15
- c) 16
- ☒ d) 30

$$255.255.255.224 \Rightarrow /27 \Rightarrow 32 - 27 = 5$$

$$\Rightarrow 2^5 - 2 = 30 \text{ possible hosts}$$

36) What does a mask /28 mean?

- a) The maximum number of IP addresses that can be assigned to hosts is 16
- ☒ b) The maximum number of IP addresses that can be assigned to hosts is 14
- c) The maximum number of IP addresses that can be assigned to hosts is 8
- d) The maximum number of IP addresses that can be assigned to hosts is 30

$$32 - 28 = 4 \Rightarrow 2^4 - 2 = 16 - 2 = 14 \text{ hosts}$$

38) You need to subnet a network that has 7 subnets, each with at least 16 hosts. Which classful subnet mask would you use?

- a) 255.255.255.192
- ☒ b) 255.255.255.224
- c) 255.255.255.240
- d) 255.255.255.252

$$192 \Rightarrow 2^2 = 4 \text{ and } 2^6 - 2 = 62 \Rightarrow \text{not enough subnets}$$

$$224 \Rightarrow 2^3 = 8 \text{ and } 2^5 - 2 = 30$$

$$240 \Rightarrow 2^4 = 16 \text{ and } 2^4 - 2 = 14 \Rightarrow \text{not enough hosts}$$

$$252 \Rightarrow 2^6 = 64 \text{ and } 2^2 - 2 = 2 \Rightarrow \text{not enough hosts}$$

39) You have an interface on a router with the IP address of 192.168.192.10/29. Including the router interface, how many hosts can have IP addresses on the LAN attached to the router interface?

- ☒ a) 6
- b) 7
- c) 8
- d) 14

$$32 - 29 = 3 \Rightarrow 2^3 - 2 = 8 - 2 = 6$$

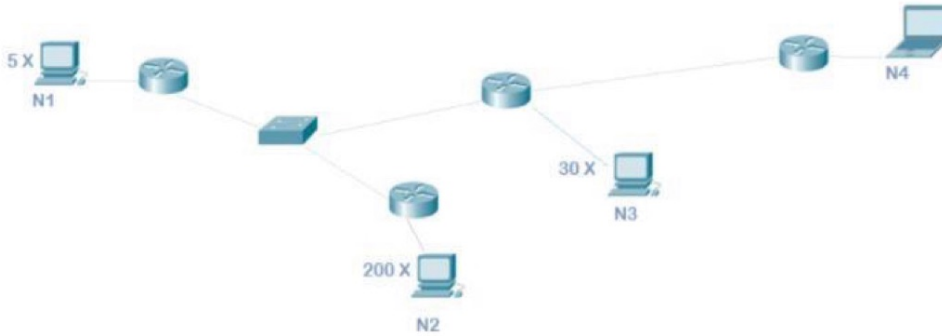
40) The network address if 172.16.0.0/19 provides how many subnets and hosts?

- a) 7 subnets, 30 hosts each
- ☒ b) 8 subnets, 8190 hosts each
- c) 8 subnets, 2046 hosts each
- d) 7 subnets, 2046 hosts each

$$32 - 19 = 13 \Rightarrow 2^{13} - 2 = 8190 \text{ hosts}$$

$$16 - 13 = 3 \Rightarrow 2^3 = 8 \text{ subnets}$$

41)



Given the network above, choose which of the next are correct IP addresses for each subnet in the picture (N1, N2, N3, N4):

- a) N1 -> 1.168.19.72/30, N2 -> 1.168.19.0/24, N3 -> 1.168.19.84/26, N4 -> 1.168.19.80/30
- ☒ b) N1 -> 1.168.19.72/29, N2 -> 1.168.18.0/24, N3 -> 1.168.19.0/26, N4 -> 1.168.19.80/30
- c) N1 -> 1.168.19.72/29, N2 -> 1.168.18.0/26, N3 -> 1.168.19.0/26, N4 -> 1.168.19.80/30
- d) N1 -> 1.168.19.72/29, N2 -> 1.168.18.0/24, N3 -> 1.168.19.144/26, N4 -> 1.168.19.80/30

N1: for /30 $\Rightarrow 32 - 30 = 2 \Rightarrow 2^2 - 2 = 2 \Rightarrow$ only 2 computers,
but we need 5 \Rightarrow /29 (where $2^3 - 2 = 6$)

N2: for /24 $\Rightarrow 32 - 24 = 8 \Rightarrow 2^8 - 2 = 254$

N3: for /26 $\Rightarrow 32 - 26 = 6 \Rightarrow 2^6 - 2 = 62$

N2 starts from .18.0 \Rightarrow N3 starts from .19.0

108) If I have a zip of size 1024 bytes and a connection of 32 bits/second to the computer I want to send the zip to, how long would it take for the zip to be sent?

- ☒ a) 256 seconds
- b) second
- c) 10 seconds
- d) 1024 seconds

$$1024 \text{ byts} * \frac{8 \text{ bits/byte}}{32 \text{ bits/second}} = 1024 * 0,25 = 256 \text{ seconds}$$

124) Which of the following IP sets belong to 209.220.186.12/255.255.255.252 IP class?

- ☒ a) 209.220.186.12, 209.220.186.13, 209.220.186.14, 209.220.186.15
- b) 209.220.186.13, 209.220.186.14, 209.220.186.15, 209.220.186.16
- c) 209.220.186.12, 209.220.186.13, 209.220.186.14, 209.220.186.15, 209.220.186.16, 209.220.186.17, 209.220.186.14, 209.220.186.18
- d) 209.220.186.10, 209.220.186.11, 209.220.186.12, 209.220.186.13, 209.220.186.14, 209.220.186.15, 209.220.186.16, 209.220.186.17

255.255.255.252 $\Rightarrow 2^2 = 4$ addresses included NA and BA

125) Which of the following is a valid IP/Netmask combination?

- a) 209.220.186.8/255.255.255.240
- b) 209.220.186.8/255.255.255.0
- c) 209.220.186.8/255.255.255.248
- d) 209.220.186.8/255.255.255.252
- ☒ e) C and D are both correct

$$248 \Rightarrow 255 - 248 = 7 = 2^2 + 2^1 + 2^0$$

$$\Rightarrow 3 \text{ zeros} \Rightarrow 2^3 = 8 \Rightarrow 8 / 4 \Rightarrow \text{valid IP/netmask}$$

$$252 \Rightarrow 255 - 252 = 3 = 2^1 + 2^0$$

$$\Rightarrow 2 \text{ zeros} \Rightarrow 2^2 = 4 \Rightarrow 8 / 4 \Rightarrow \text{valid IP/netmask}$$

126) How many bits of zero does the following netmask have: 255.255.255.248?

- a) 2 bits
- ☒ b) 3 bits
- c) 4 bits
- d) 8 bits

$$255 - 248 = 7 = 2^2 + 2^1 + 2^0 \Rightarrow 3 \text{ bits of } 0$$

128) What is the netmask for the following IP class: 192.168.0.0/24?

- a) 255.255.255.128
- ☒ b) 255.255.255.0
- c) 255.255.0.0
- d) 255.0.0.0
- e) All netmasks are correct

$$32 - 24 = 8 \text{ zeros} \Rightarrow 255.255.255.0$$

129) What is the netmask for the following IP class: 10.10.0.0/17?

- a) 255.255.255.128
- b) 255.255.255.0
- ☒ c) 255.255.128.0
- d) 255.255.0.0
- e) All netmasks are correct

$$32 - 17 = 15 \text{ zeros} \Rightarrow 255.255.128.0$$

137) What is the broadcast address of the following IP address 221.17.123.9 that has in its network 42 computers?

- a) 221.17.123.255
- b) 255.255.255.255
- ☒ c) 221.17.123.63
- d) 221.17.123.65

$$42 \Rightarrow 2^6 = 64 > 42 \Rightarrow \text{BA has the last partian } 63 \text{ (} 64 - 1 \text{)}$$

142) In how many subclasses with the netmask 255.192.0.0 can be the class of minimal dimension containing both IP addresses: 78.79.80.81 and 79.80.81.82 be divided?

- a) 7
- b) 10
- ☒ c) 8
- d) 9

$255.192.0.0 \Rightarrow /10 \Rightarrow$ class B which is $255.255.0.0$

157) Which is the network address of the second subnet of a network having 93 computers, where the first contains 22 computers, and starts from 192.168.0.0?

- a) 192.168.0.33
- ☒ b) 192.168.0.32
- c) 192.168.0.24

first one starts from .0 with 22 computers

$\Rightarrow 2^5 = 32 > 22 \Rightarrow BA = .31$ and the second one starts from .32 $\Rightarrow NA = .32$

162) The network address of the third subnet of a network having 93 computers that starts from 192.168.0.0 where the first contains 22 computers and the second has 10 hosts is ...192.168.0.48

first one: $0.0 \rightarrow 0.31$

10 hosts can be in $2^4 = 16$ subnets

second one: $0.32 \rightarrow 0.47$

third one: 0.48

171) Which of the following is NOT a valid IP netmask combination?

- a) 168.220.186.8/255.255.225.252
- b) 156.198.186.8/255.255.255.254
- ☒ c) 209.198.186.8/255.255.255.246
- d) 168.220.186.64/255.255.255.240

$$254 \Rightarrow 255 - 254 = 1 = 2^0$$

$\Rightarrow 1 \text{ zero} \Rightarrow 2^1 = 2 \Rightarrow 8/2 \Rightarrow$ valid IP/netmask

$$246 \Rightarrow 255 - 246 = 9 = 2^3 + 2^0$$

$\Rightarrow 246$ is 1111 0110 not a valid netmask

$$240 \Rightarrow 255 - 240 = 15 = 2^3 + 2^2 + 2^1 + 2^0$$

$\Rightarrow 4 \text{ zero} \Rightarrow 2^4 = 16 \Rightarrow 64/16 \Rightarrow$ valid IP/netmask

173) Which of the following is NOT a valid IP netmask combination?

- a) 168.220.186.8/225.255.225.252
- b) 156.198.186.16/255.255.255.254
- c) 209.198.186.8/255.255.255.248
- d) 168.220.186.8/255.255.255.240

$$240 \Rightarrow 255 - 240 = 15 = 2^3 + 2^2 + 2^1 + 2^0$$

$\Rightarrow 4 \text{ zeros} \Rightarrow 2^4 = 16 \Rightarrow 8/16 \Rightarrow \text{invalid IP/netmask}$

192) The subnet address of a host with an IP address of 172.16.66.0/21 is 172.16.64.0.

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$$32 - 21 = 11 \text{ bits of zero}$$

$$\begin{array}{cccc} 0100 & 0010 & . & 0000 & 0000 & \text{AND} \\ 1111 & 1000 & . & 0000 & 0000 & \\ \hline 0100 & 0000 & . & 0000 & 0000 & \Rightarrow 64.0 \end{array}$$

524) A /24 class can be divided in 2 /25 subclasses.

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$$/24 \Rightarrow 2^8 = 256$$

$$/25 \Rightarrow 2^7 = 128$$