NETWORKING

CIDR

ASSSIGNMENT #1

PREPARED BY
RAJEEV KHOODEERAM

SUBMITTED TO
RICHI FURMAH

JUNE 27, 2025

QUESTION 1 (A)

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	VALUE
128	64	32	16	8	4	2	1	
0	**1**	0	**1**	**1**	0	0	0	**88**
						64 + 16 + 8		
1	**1**	**1**	**1**	0	0	0	**1**	**241**
					128 + 64 + 32 + 16 + 1			
0	**1**	**1**	0	0	0	**1**	**1**	**99**
						64 + 32 + 2 + 1		
0	0	**1**	0	**1**	0	**1**	0	**42**
						32 + 8 + 2		
1	0	**1**	0	**1**	0	0	**1**	**169**
						128 + 32 + 8 + 1		
1 — —-0	0	1	1	0	1	1	1	**311**
Require 9 bits					***256 + 32 + 16 + 4 + 2 + 1***			

QUESTION 1 (B)

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	VALUE
128	64	32	16	8	4	2	1	
0	**1**	0	**1**	**1**	**1**	0	0	
						64 + 16 + 8 + 4		**92**
0	0	1	1	1	1	0	0	
						32 + 16 + 8 + 4		**60**
1	**1**	**1**	1	0	0	**0**	**0**	
						128 + 64 + 32 + 16		**240**
1	0	**1**	0	**1**	0	**1**	1	
						128 + 32 + 8 + 2 + 1		**171**
1	1	**0**	0	**1**	0	1	**1**	
						128 + 64 + 8 + 2 + 1		**203**
0	1	1	1	1	1	0	1	
						64 + 32 + 16 + 8 + 4		**125**

QUESTION 2

3.0.0.0/8		Class	A		Default Subnet	255.0.0.0		
New CIDR	**3.0.0.0/11**	No. Of subnets	6		New Subnet	255.11100000.0.0 (borrow 3) **255.224.0.0**		
						21 bits remaining for hosts		
First 3 usable ranges	3.0.0.0	**3.0.0.1 - 3.31.255.254**			Number of hosts per subnet (2 21)		**2,097,152**	
	3.32.0.0	**3.32.0.1 - 3.63.255.254**			**Usable**		2,097,150	
	3.64.0.0	**3.64.0.1- 3.95.255.254**						
192.168.7.0/24		Class	C		Default Subnet	255.255.255.0		
New CIDR	192.168.7.0 /28	No. Of subnets	11		New Subnet	255.255.255.11110000 (borrow 4) **255.255.255.240**		
						4 bits remaining for hosts		
First 3 usable ranges	192.168.7.0	**192.168.7.1 - 192.168.7.14**			Number of hosts per subnet (2 4)		**16**	
	192.168.7.16	**192.168.7.17 - 192.168.7.30**			**Usable**		14	
	192.168.7.32	**192.168.7.33 - 192.168.7.46**						

131.19.0.0/16		Class	B		Default Subnet	255.255.0.0		
New CIDR	**131.19.0.0/17**	No. Of subnets	2		New Subnet	255.255.1000000.0 (borrow 1) **255.255.128.0**		
						15 bits remaining for hosts		
First 3 usable ranges	131.19.0.0	**131.19.0.1 - 131.19.127.254**			Number of hosts per subnet (2 15)		**32,768**	
	131.19.128.0	**131.19.128.1 - 131.19.255.254**			**Usable**		32,766	
111.0.0.0/8		Class	A		Default Subnet	255.0.0.0		
New CIDR	**111.0.0.0/12**	No. Of subnets	15		New Subnet	255.11110000.0.0 (borrow 4) **255.240.0.0**		
						20 bits remaining for hosts		
First 3 usable ranges	111.0.0.0	**111.0.0.1 - 111.15.255.254**			Number of hosts per subnet (2 20)		**1,048,576**	
	111.16.0.0	**111.16.0.1 - 111.31.255.254**			**Usable**		1,048,574	
	111.32.0.0	**111.32.0.1 - 111.47.255.254**						

177.2.0.0/16		Class	B		Default Subnet	255.255.0.0		
New CIDR	**177.2.0.0/21**	No. Of subnets	21		New Subnet	255.255.11111000.0 (borrow 5) **255.255.248.0**		
						11 bits remaining for hosts		
First 3 usable ranges	177.2.0.0	**177.2.0.1 - 177.2.7.254**			Number of hosts per subnet (2 11)		**2,048**	
	177.2.8.0	**177.2.8.1 - 177.2.15.254**			**Usable**		2,046	
	177.2.16.0	**177.2.16.1 - 177.2.23.254**						
220.13.42.0/24		Class	C		Default Subnet	255.255.255.0		
New CIDR	**220.13.42.0 /26**	No. Of subnets	3		New Subnet	255.255.255.11000000 (borrow 2 bits) **255.255.255.192**		
						6 bits remaining for hosts		
First 3 usable ranges	220.13.42.0	**220.13.42.1 - 220.13.42.62**			Number of hosts per subnet (2 6)		**64**	
	220.13.42.64	**220.13.42.65 - 220.13.42.126**			**Usable**		62	
	220.13.42.128	**220.13.42.129 - 220.13.42.190**						

QUESTION 3

101.0.0.0/8		Class	A		Default Subnet	255.0.0.0		
New CIDR	**101.0.0.0/19**	No. Of subnets	1300		New Subnet	255.11111111.11100000.0 (borrow 11) **255.224.0.0**		
	2^10 = 1024 (too small); so we take 11					13 bits remaining for hosts		
First 3 usable ranges	101.0.0.0	**101.0.0.1 to 101.0.31.254**			Number of hosts per subnet (2 13)	**8,192**		
	101.0.32.0	**101.0.32.1 to 101.0.63.254**			**Usable**	8,190		
	101.0.64.0	**101.0.64.1 to 101.0.95.254**						
Last 3 usable ranges	101.255.104.0	**101.255.104.1 – 101.255.135.254**						
	101.255.136.0	**101.255.136.1 – 101.255.167.25**						
	101.255.168.0	**101.255.168.1 – 101.255.199.254**						

Subnet Details

- **Original Network**: 101.0.0.0/8
- **New Subnet Mask**: /19 (255.255.224.0)
- **Number of Subnets**: 2048. (2 ^ 11)
- **Hosts per Subnet**: 8190 usable IPs. (2 ^ 13. - 2)
- **Subnet increment**: every 32 in the **3rd octet**

QUESTION 4 (A)

GIVEN	NEW	SECOND SUBNET	RANGE	BROADCAST
3.0.0.0/8	**3.0.0.0/11**	3.32.0.0	**3.32.0.1 - 3.63.255.254**	**3.63.255.255**
192.168.7.0/24	**192.168.7.0 /28**	192.168.7.16	**192.168.7.17-192.168.7.30**	**192.168.7.30**
131.19.0.0/16	**131.19.0.0/17**	131.19.128.0	**131.19.128.1 - 131.19.255.254**	**131.19.255.255**
111.0.0.0/8	**111.0.0.0/12**	111.16.0.0	**111.16.0.1 - 111.31.255.254**	**111.31.255.255**
177.2.0.0/16	**177.2.0.0/21**	177.2.8.0	**177.2.8.1 - 177.2.15.254**	**177.2.15.255**
220.13.42.0/24	**220.13.42.0 /26**	220.13.42.64	**220.13.42.65 - 220.13.42.126**	**220.13.42.127**

QUESTION 4 (B)

GIVEN	NEW	SECOND SUBNET	RANGE	BROADCAST
101.0.0.0/8	**101.0.0.0/19**	101.0.32.0	**101.0.32.1 to 101.0.63.254**	**101.0.63.255**

QUESTION 5

(a) **192.168.7.62/28 and 192.168.7.70/28.** **[NO]**

- Class C
- Default mask : 255.255.255.0 (/24)
- /28 implies 4 bits have been borrowed (leading to 2^4 subnets)
- We break the **192.168.7.x** range into blocks of 16

The subnets will be as follows :

0..15, 16..31, 32..63, 64..95, etc

We can clearly see that 192.168.7.62 is in 3rd subnet while 192.168.7.70 is in 4th subnet.

(b) **88.91.0.113/11 and 88.95.45.1/11** **[YES]**

- Class A
- Default mask : 255.0.0.0 (/8)
- /11 implies 3 bits have been borrowed (leading to 2^5 subnets)

255.1110 0000.0.0 ==> 255.224.0.0

- We AND both IP addresses with 255.224.0.0, we get 88.64.x.x (that is they are not on the network 88.64.0.0)

Ex :	88.91.0.113	88.95.45.1
	255.224.0.0	255.224.0.0
	88.64.0.0	88.64.0.p

(c) **4.0.0.6/16 and 4.0.5.2/16** **[YES]**

- Class A
- Default mask : 255.0.0.0 (/8)
- /16 implies 8 bits have been borrowed leading to 255.255.0.0
- We AND both IP addresses with 255.255.0.0, we get 4.0.0.0 (that is they are both on the network 4.0.x.x)

(d) **155.19.161.2/22 and 155.19.141.7/22.** **[NO]**

- Class B
- Default mask : 255.255.0.0 (/16)
- /22 implies 6 bits have been borrowed from 3rd octet leading to 255.255.252.0

If we bitwise AND both IP addresses (we ignore the first two bytes as the mask for these two octets are 255, we are left with the 3rd octet..let's do the calculation :

161	1010 0001	141	1000 1101
252	1111 1100	252	1111 1100
	1010 0001		**1000 1100.** **(Not same answer; not same subnet)**

(e) **201.251.199.21/26 and 201.251.199.55/26 [YES]**

- Class C
- Default mask : 255.255.255.0 (/24)
- /26 implies 2 bits have been borrowed leading to 255.255.255.1100 0000
- 255.255.255.192

If we bitwise AND both IP addresses (we ignore the first three bytes as the mask for these three octets are 255, we are left with the 4th octet..let's do the calculation :

21	0001 0101	55	0011 0111	
192	1100 0000	192	1100 0000	
	0000 0000		**0000 0000**	**(same answer; same subnet)**

(f) **181.14.22.7/25 and 181.14.22.102/25 [YES]**

- Class B
- Default mask : 255.255.0.0 (/16)
- /25 implies 9 bits have been borrowed leading to 255.255.255.1000 0000

If we bitwise AND both IP addresses (we ignore the first three bytes as the mask for these three octets are 255, we are left with the 4th octet..let's do the calculation :

7	0000 0111	102	0110 0110	
128	1000 0000	128	1000 0000	
	0000 0000		**0000 0000**	**(same answer; same subnet)**

QUESTION 6

a. Supernetting these 4 IPs

192.168.88.0/24

192.168.89.0/24

192.168.90.0/24

192.168.91.0/24

They are all on class C; default mask is 255.255.255.0; they are all having same values on first two octets which are : 192.168.x.x

Let us convert 88 to 91 into binary which give us :

88 = 010110 00

89 = 010110 01

90 = 010110 10

91 = 010110 11

It seems that the first 6 bits are identical, let us add this "6" to the previous 16 bits mask giving us 22.

So the new mask for the superset is 16 + 6 : 255.255.1111 1100.0

255.255.252.0. <—

b. This means that the network address is 192.168.88.0**, and since we are left with 10 bits for host (2 ^ 10 =1024 = 0..1023), the broadcast IP address will be 192.168.91.255).**