UNIT 08: IP and Subnetting Exercises

1. **Write the subnet, broadcast address and valid host range for the following:**

   a. **192.168.100.17, with 4 bits of subnetting**

IP	192	168	100	**17**
Mask	255	255	**255**	**0**
Mask Binary	1111 1111	1111 1111	**1111 1111**	**0000 0000**
Mask Sub	1111 1111	1111 1111	1111 1111	1111 0000
New Mask	255	255	255	240
IP	192	168	100	0001 0001
For **Host** all 0 and sum all the indicated numbers			128 64 32 16 8 4 2 1	128 64 32 16 8 4 2 1
				0001 0000
	192	**168**	**100**	**16**
For **Broadcast** all 1 and sum all the indicated numbers			128 64 32 16 8 4 2 1	128 64 32 16 8 4 2 1
				0001 1111
	192	**168**	**100**	**31**
Valid Range	**192**	**168**	**100**	**17**
	192	**168**	**100**	**30**
To get the number of hosts just take the number of bits dedicated to host (4) square ^{2,} minus the ones dedicated to broadcast and network > **2^4 = 16– 2 = 14 Possible hosts**				

   b. **192.168.100.66, with 3 bits of subnetting**

IP	192	168	100	**66**
Mask	255	255	**255**	**0**
Mask Binary	1111 1111	1111 1111	**1111 1111**	**000 0 0000**
Mask Sub	1111 1111	1111 1111	1111 1111	**111** 1 0000
New Mask	255	255	255	224
IP	192	168	100	010 0 0010
For **Host** all 0 and sum all the indicated numbers			128 64 32 16 8 4 2 1	128 64 32 16 8 4 2 1
				0100 0 000
	192	**168**	**100**	**64**
For **Broadcast** all 1 and sum all the indicated numbers			128 64 32 16 8 4 2 1	128 64 32 16 8 4 2 1
				010 1 1111
	192	**168**	**100**	**95**
Valid Range	**192**	**168**	**100**	**65**
	192	**168**	**100**	**94**
To get the number of hosts just take the number of bits dedicated to host (5) square ^{2,} minus the ones dedicated to broadcast and network > **25 = 32–2 = 30 Possible hosts**				

c. 172.16.10.5/20

IP	172	16	10	**5**
Mask Binary	1111 1111	1111 1111	1111 **0000**	**0000 0000**
Mask	255	255	240	0
IP	172	16	10	5
IP 20 bits	172	16	0000 **1010**	**0000 0101**
For **Host** all 0 and sum all the indicated numbers			128 64 32 16 8 4 2 1	128 64 32 16 8 4 2 1
	172	16	0000 0000	**0000 0000**
	172	**16**	**0**	**0 /20**
For **Broadcast** all 1 and sum all the indicated numbers			128 64 32 16 8 4 2 1	128 64 32 16 8 4 2 1
	172	16	0000 1111	**1111 1111**
	172	**16**	**15**	**255**
Valid Range	**172**	**16**	**0**	**1**
	172	**16**	**15**	**254**
To get the number of hosts just take the number of bits dedicated to host (12) square ^{2,} minus the ones dedicated to broadcast and network > **2^{12} = 4096 –2 = 4094 Possible hosts**				

d. 172.16.10.33/255.255.252.0

IP	172	16	10	**33**
Mask Binay	1111 1111	1111 1111	**1111 1100**	**0000 0000**
Mask	255	255	252	0
IP	172	16	0000 10**10**	**0010 0001**
IP 22 bits	172	16	**0000 10 10**	**0010 0001**
For **Host** all 0 and sum all the indicated numbers			128 64 32 16 8 4 2 1	128 64 32 16 8 4 2 1
	172	16	0000 10 00	**0000 0000**
	172	**16**	**8**	**0**
For **Broadcast** all 1 and sum all the indicated numbers			128 64 32 16 8 4 2 1	128 64 32 16 8 4 2 1
	172	16	0000 10 11	**1111 1111**
	172	**16**	**11**	**255**
Valid Range	**172**	**16**	**8**	**1**
	172	**16**	**11**	**254**
To get the number of hosts just take the number of bits dedicated to host (10) square ^{2,} minus the ones dedicated to broadcast and network > **2^{10} = 1024 –2 = 1022 Possible hosts**				

2. **You have been asked to create a subnet that supports 126 hosts. What subnet mask is the most efficient one?**

For 126 host we need 7 bits because $2^7 = 126$ so it´s the closet number				
According to that we create the binary sequence and then translate it to decimal				7 bits for host = 0
Binary	1111 1111	1111 1111	1111 1111	1000 0000
Mask	**255**	**255**	**255**	**128**
				/25 bits network

3. **Given the following information.**

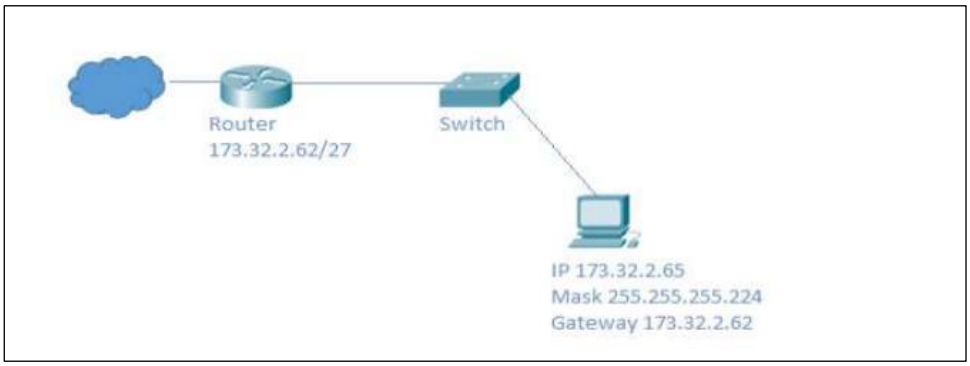
   How many subnets are there? How many hosts? What are the valid subnets?

   a. **Network address: 192.168.10.0**

   b. **Subnet mask: 255.255.255.192**

192	168	10	0
255	255	255	192
			128 64 32 16 8 4 2 1
1111 1111	1111 1111	1111 1111	11 00 0000
			/26 bits network
		2 bits for Subnets means 4 subnets ($2^{2)}$	
Magic number is 64 – Network and Broadcast = 62 Possible Host			
Possible Combinations are (Host = 0 | Broadcast =1)			
00 000000_2= 0	01 000000 = 64	10 000000 = 128	11 000000 = 192
Network			
192.168.10.0	192.168.10.64	192.168.10.128	192.168.10.192
Broadcast			
192.168.10.63	192.168.10.127	192.168.10.191	192.168.10.255
Valid Range			
192.168.10.1 192.168.10.62	192.168.10.65 192.168.10.126	192.168.10.129 192.168.10.190	192.168.10.193 198.168.10.254

4. **What is the problem in this Network?**



The router and the host must be in the same network, but Router is in Network 2 and Host in Network 3

Mask			
255	255	255	224
Mask in Binary			
1111 1111	1111 1111	1111 1111	1110 0000
8 + 8 + 8 + 3 = 27 bits network | 5 bits Host | Magic Number is 32 –2 = 30			
Network 1	173.32.2.0 (0)	173.32.2.31	
Network 2	173.32.2.32 (+32)	173.32.2.63	**Router is 173.32.2.62**
Network 3	173.32.2.64 (+32)	173.32.2.95	**Computer is 173.32.2.65**
Network 4	173.32.2.96 (+32)	173.32.0.127	

5. **XYZ Company would like to subnet its network so that there are five separate subnets. They will need 25 computers in each subnet. Complete the following table:**

   <u>NOTE</u>: If you create more than five subnets, list the extra ones too.

First, we need to know the minimum mask for 25 computers. So, if we need 5 subnets and each one its 2 bits then $2^5 = 32$ minus Host and Broadcast = 30 Host. Therefore, we can use a Class C mask (up to 8 bits for host) and get the binary subnet mask.					
SubMask Binary	1111 1111	1111 1111	1111 1111	111 0 0000	
SubMask Decimal	255	255	255	224	
			NETWORK	SUBNETS	**HOST**
	255	255	255	111	**00000**
3 bits for Subnets = $2^3 = 8$ Maximum subnets however we only need 5					
Subnet	**Network Adress**	**Host addresses**		**Broadcast Adress**	
Subnet Mask	255	255	255	224	
First Subnet	192.168.162.0	192.168.162.1	192.168.162.30	192.168.162.31	
Second Subnet	192.168.162.32	192.168.162.33	192.168.162.62	192.168.162.63	
Third Subnet	192.168.162.64	192.168.162.65	192.168.162.94	192.168.162.95	
Fourth Subnet	192.168.162.96	192.168.162.97	192.168.162.126	192.168.162.127	
Fifth Subnet	192.168.162.128	192.168.162.129	192.168.162.159	192.168.164.159	
Sixth Subnet	192.168.162.160	192.168.162.161	192.168.162.190	192.168.162.191	
Seventh Subnet	192.168.162.192	192.168.162.193	192.168.162.222	192.168.162.223	
Eighth Subnet	192.168.162.224	192.168.162.225	192.168.162.254	192.168.162.255	