0Mount Royal University
Department of Mathematics and Computing
COMP 3532 System Administration and Maintenance
Assignment 3

Given: March 21, 2016

Due Date: April 04, 2016

1. Fill in the table below:

Prefix	Network Mask	Total Addresses	Usable Addresses
/18	255.255.192.0	16,384	16,382
/18	255.255.192.0	16,384	16,382
/26	255.255.255.192	64	62
/28	255.255.255.240	16	14
/15	255.254.0.0	131,072	131,070

2. Compare the two IP Addresses using the given mask. Are they in the same subnet?

First IP Address	Second IP Address	Mask	Same Subnet?
10.5.20.217	10.6.20.200	255.255.224.0	**no**
192.168.0.255	192.168.1.0	/23	**yes**
175.25.197.13	175.25.190.49	255.255.224.0	**no**
175.25.197.13	175.25.190.49	/17	**yes**
115.11.58.13	115.11.58.11	255.255.255.252	**no**
137.85.67.111	137.85.76.94	/18	**yes**

3. Determine the subnet and broadcast addresses of the subnet that contains the given IP address and mask.

IP Address	Mask	Network Address	Broadcast Address
192.168.1.45	255.255.255.0	**192.168.1.0**	**192.168.1.255**
192.168.1.45	/27	**192.168.1.32**	**192.168.1.63**
10.0.11.12	255.255.254.0	**10.0.10.0**	**10.0.11.255**
172.5.12.20	/22	**175.5.12.0**	**175.5.15.255**
147.10.13.12	255.255.254.0	**147.10.12.0**	**147.10.13.255**
222.11.33.115	/18	**222.11.0.0**	**222.11.63.255**

4. You've been given a block of IP addresses as defined by the mask in the first column. You decide to subdivide that block into multiple smaller blocks as defined by the mask in the second column. Fill in the table with the missing information. You can use all subnets (subnet zero is not reserved.)

Mask Given	Mask Giving Out	# of Subnets	Usable Hosts for Each Subnet
/24	/27	**8**	**30**
/24	255.255.255.252	**64**	**2**
255.255.240.0	255.255.255.192	**64**	**62**
/21	/27	**64**	**30**
255.255.254.0	255.255.255.224	**16**	**30**
/25	255.255.255.248	**16**	**6**

5. Use the subnetting worksheet to show and record all answers for each problem:

Problem 1

Host IP Address	**100.210.88.12**
Network Mask	**/19**
Network Address	100.210.64.0
Network Broadcast Address	100.210.95.255
Total Number of Host Bits	13
Subnet Mask	**/22**
Number of Subnet Bits	**3**
Number of Subnets	**8**
Number of Host Bits per Subnet	**10**
Number of Usable Hosts per Subnet	**1022**
Subnet Address for this IP Address	**100.210.88.0**
IP Address of First Host on this Subnet	**100.210.88.01**
IP Address of Last Host on this Subnet	**100.210.91.254**
Broadcast Address for this Subnet	**100.210.91.255**

Problem 2

Host IP Address	**137.22.31.8**
Network Mask	**/20**
Network Address	137.22.16.0
Network Broadcast Address	137.22.31.255
Total Number of Host Bits	12
Subnet Mask	**/25**
Number of Subnet Bits	**5**
Number of Subnets	**32**
Number of Host Bits per Subnet	**7**
Number of Usable Hosts per Subnet	**126**
Subnet Address for this IP Address	**137.22.31.0/25**
IP Address of First Host on this Subnet	**137.22.31.1/25**
IP Address of Last Host on this Subnet	**137.22.31.126/25**
Broadcast Address for this Subnet	**137.22.31.127**

6. Given an IP address of 147.47.30.0/17 and knowing the client needs 16 subnets. Answer the following questions.

The network address is:	147.47.0.0
The required subnet mask is	255.255.248

The maximum number of subnets that are available with this subnet mask is	16
List all available subnets	147.47.0.0 147.47.8.0 147.47.16.0 147.47.24.0 147.47.32.0 147.47.40.0 147.47.48.0 147.47.56.0 147.47.64.0 147.47.72.0 147.47.80.0 147.47.88.0 147.47.112.0 147.47.120.0
The subnet that this IP address falls on is	147.47.24.0
The range of host IP addresses that occur on this subnet is	147.27.24.1 - 147.31.254
The maximum number of hosts that can occur on this subnet	2^11 -2 = 2046

7. For the address 147.3.0.0/16, Joe needs to create 50 subnets, each supporting up to 1000 hosts; he selects the subnet mask 255.255.252.0. Explain why this will or not work

2^6 = 64 which is greater than 50 to accommodate 50 subnets
We can borrow **6 bits** from host.

147.3.0.0 = 10010011 00000011 |**000000**|00 00000000
Subnet address = 11111111 11111111 11111100 00000000

Since this IP falls under the same subnet of 255.255.252.0, **this will work**

8. Given an IP block of 142.100.20.0/22. Assign subnets to the LANs below with the correct size subnets.
    a. Subnet HQ: 480 hosts
    b. Subnet sales: 210 hosts
    c. Subnet HR: 100 hosts
    d. Subnet IT support: 50 hosts

Subnet	Network Address (IP/Mask)	First Usable IP	Last Usable IP	Broadcast Address
HQ	142.100.20.0/23	142.100.20.1	142.100.21.254	142.100.21.255
SALES	142.100.22.0/24	142.100.22.1	142.100.22.254	142.100.22.255
HR	142.100.23.0/25	142.100.23.1	142.100.23.126	142.100.23.127
IT	142.100.24.0/26	142.100.24.1	142.100.24.62	142.100.24.63