INS: Tutorial 1

Question 1

Given the network 193.1.1.0 / 24, which has been divided into 8 subnets using fixed-length subnetting:

1. The network address is 193.1.1.0 / 24
2. The network address of subnet 6 is 193.1.1.192 / 27
3. The network address of subnet 0 is 193.1.1.0 / 27
4. The broadcast address of subnet 6 is 193.1.1.223 / 27

Question 2

A company has a network block of 137.73.0.0 / 16 and needs 6 subnets with the following capacities:

- One subnet with up to 20,000 hosts
- Two subnets with up to 8,000 hosts
- Three subnets with up to 4,000 hosts

The largest block needs 15 bits to store the host ID ($2^{15} - 2 = 32766$), leaving 1 bit for the subnet ID. This allows the following address:

- 10001001.01001001.**0**0000000.00000000 / 17 (= 137.073.000.000 / 17)

The next two blocks need 13 bits to store the host ID ($2^{13} - 2 = 8190$), leaving 3 bits for the subnet ID, the first of which has to be 1. This gives them the following network addresses:

- 10001001.01001001.**100**00000.00000000 / 19 (= 137.073.128.000 / 19)
- 10001001.01001001.**101**00000.00000000 / 19 (= 137.073.160.000 / 19)

The last three blocks need 12 bits to store the host ID ($2^{12} - 2 = 4094$), leaving 4 bits for the subnet ID, the first two of which have to be 11. This gives them the following network addresses, the last of which is spare:

- 10001001.01001001.**1100**0000.00000000 / 20 (= 137.073.192.000 / 20)
- 10001001.01001001.**1101**0000.00000000 / 20 (= 137.073.208.000 / 20)
- 10001001.01001001.**1110**0000.00000000 / 20 (= 137.073.224.000 / 20)
- 10001001.01001001.**1111**0000.00000000 / 20 (= 137.073.240.000 / 20)