

# Computer Networks

Homework 5

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## Problem 1:

Subnet the (class B) network 175.50.0.0 into 40 subnets of the same size. Find:

- a) the new subnet mask,
- b) the number of addresses in each subnet,
- c) the first and last address in subnet 1,
- d) the first and last address in subnet 3.

Address = 175.50.0.0/16

$N_{nb} = \text{ceil}(\log_2 40) = 6$

- a. New subnet mask =  $/(16 + 6) = /22$

**Answer:** The new subnet mask is /22.

- b.  $N_{aps} = 2^{(32 - 22)} - 2 = 2^{10} - 2 = 1022$

**Answer:** The number of (host) addresses in each subnet is 1022.

Subnet size =  $2^8 / 2^6 = 256 / 64 = 4$

- c. Subnet 1, first address = 175.50.0.0/22

Subnet 1, last address = 175.50.3.255/22

**Answer:** The first address of subnet 1 is 175.50.0.0/22 and the last address of subnet 1 is 175.50.3.255/22.

- d. Subnet 3, first address = 175.50.8.0/22

Subnet 3, last address = 175.50.11.255/22

**Answer:** The first address of subnet 3 is 175.50.8.0/22 and the last address of subnet 1 is 175.50.11.255/22.

## Problem 2:

- a) Compress the (IPv6) address 6B42:00F0:D258:0000:0000:0000:AF38:F400.
- b) Decompress the address AA12::1.
- c) Why is the rule of replacing consecutive “0000” sections with “::” only allowed to be used once? (Hint: for example, where would you encounter a problem when decompressing the invalid address 1234::BBBB::7777?)

Address = 6B42:00F0:D258:0000:0000:0000:AF38:F400

Compressed address = 6B42:F0:D258::AF38:F400

- a. **Answer:** The compressed address is 6B42:F0:D258::AF38:F400.

Compressed address = AA12::1

Number of parts = 2

Number of compressed 0 parts =  $8 - 2 = 6$

Decompressed address = AA12:0000:0000:0000:0000:0000:0000:0001

- b. **Answer:** The decompressed address is AA12:0000:0000:0000:0000:0000:0000:0001.
- c. **Answer:** The rule of replacing consecutive “0000” sections with “::” is only allowed to be used once because we can then calculate how many sections of “0000” are missing from the address and we can insert them in. In the case of more than one part “::” we can’t deduce how many “0000” sections belong to each part respectively.