(Q3) IP address 25.34.12.56/16

(or)

255.255.0.0

(a) Calc. of network address

25.34.12.56 — 00011001.00100010.00001100.00111000

255.255.0.0 — 11111111.11111111.00000000.00000000

25.34.0.0 (X) — 00011001.00100010.00000000.00000000 [Mask ANDed]

25.34.0.1

25.34.255.255 (X) — 00011001.00100010.11111111.11111111 [Mask complement ORed]

25.34.255.254

1(a) 123.56.77.32/29

Host = 2^{32-29}

$= 2^3 = 8$ (7 usable)

11111111.11111111.11111111.11111000

host

123.56.77.00100001 → 123.56.77.33 (first)

⋮

123.56.77.00100110 → 123.56.77.38 (last)

(b) 180.34.64.64/30

180.34.64.65 → first (180.34.64.11111101)

180.34.64.66 → last (180.34.64.11111110)

(c) 200.17.21.128/27

200.17.21.10000001 → 200.17.21.129 (first)

200.17.21.10011110 → 200.17.21.158 (last)

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2. 175.200.0.0

175.200.00000000.00000000

N/w prefix | Host

175.200.00000000.0 → 175.200.0.0/18

175.200.01000000.0 → 175.200.64.0/18

175.200.10000000.0 → 175.200.128.0/18

175.200.11000000.0 → 175.200.192.0/18

(Q4) 16.0.0.0/8

↳ 500 fixed-length subnets

(1) $2^9 = 512$

subnet prefix = /17
(/8+9)

subnet mask = 255.255.128.0

(2) Subnet mask is /17

Number of bits for Host: 32-17 = 15

Each subnet has 2^{15} = 32,768 addresses
(-2)

(3)(a) 1st subnet:

1st address: 16.0.0.0 (X)

00010000 00000000 00000000 00000000

17 bits (subnet) | 15 bits (host)

16.0.0.00000001 → 16.0.0.1

last address: 00010000 00000000 01111111 11111111

17 bits | 15 bits

(X) 16. 0 . 127. 255

(Note: 255 is broadcast)

16.0.01111111.11111110 → 16.0.127.254

(6 4)

(3)(b) At subnet 500,

N/w address - 16.249.128.0

First - 16.249.128.1

to

Last - 16.249.255.254

Broadcast - 16.249.255.255

(5) 14.24.74.0/24

Allocated no. of addresses

$2^{32-24} = 2^8 = 256$

First address:

14.24.74.0/24

Last address: 14.24.74.255/24

Mask = 255.255.255.0

↳ One subblock of 120 addresses

$2^7 = 128$

First 14.24.74.0/25 ; Last 14.24.74.127/25

↳ 60 addresses

$2^6 = 64$

First 14.24.74.128/26 ; Last 14.24.74.191/26

↳ 10 addresses

$2^4 = 16$

First 14.24.74.192/28 ; Last 14.24.74.207/28

(b) 172.25.171.182

255.255.224.0

↓

/19

11111111.11111111.11100000.00000000

19 bits | 13 bits

N/w | Host

All the last 13 bits as '0' → Network address

↳ 172.25.160.0/19

↳ 172.25.191.255/19 → broad cast address