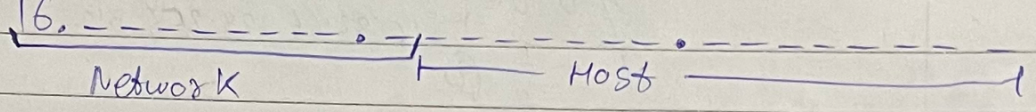
Q1) Block address ⇒ 16.0.0.0/8
Network mask = 255.0.0.0

To allocate 500 subnets we need $2^9 = 512$
closest to 500



first address of subnet 0 =

16.00000000.00000000.00000001/17

last address of subnet 0 =

16.00000000.01111111.11111110/17

~~Last add~~

First address of subnet 499 :-

16.11111001.10000000.00000001/17

Last address of subnet 499 :-

16.11111001.11111111.11111110/17

16.249.255.254/17

No. of addresses in each :- $2^{15} - 2$ usable

Q3) If an ISP has a block of 1024 addresses and needs to divide them among 1024 customers, subnetting is not necessary. Each customer can be allocated one address from the available block without subnetting, resulting in a one-to-one correspondence between addresses and customers. Subnetting is typically used when you need to divide a larger address block into smaller subnets to efficiently manage & allocate addresses to different segments of a network. In this scenario, there are already enough addresses for each customer, so subnetting isn't required.

Q2)

i) The first group consisting of 200 medium-sized businesses, each needing 128 addresses. Since 2^7 (128) is the largest power of 2 that can accomodate this, allocate a /25 subnet to each

Subnet 1: 150.80.0.0 /25

2: 150.80.0.128 /25

Q) 10.4.76.188/19

ans→

Subnet ⇒ 255.255.255.224
no. of addr = 32
usable = 30

network ID = 10.4.76.160/19
next network ID = 10.4.76.192/19
Broadcast IP = 10.4.76.191/19
first IP = 10.4.76.161/19
last IP 10.4.76.190/19

Q) 10.3.3.117/29

Subnet mast = 255.255.255.248
No. of add = 8
usable = 6

Network ID = 10.3.3.112/29
Next network = 10.3.3.120/29
Broadcast = 10.3.3.119/29
first IP = 10.3.3.113/29
last IP = 10.3.3.118/29