

#### exercise 1a

CIDR	range start	range end (inclusive)	#addresses
192.168.1.0/24	192.168.1.0	192.168.1.255	256
172.21.152.0/23	172.21.152.0	172.21.153.255	512
127.0.0.1/32	127.0.0.1	127.0.0.1	1
10.0.0.0/8	10.0.0.0	10.255.255.255	16,777,216
0.0.0.0/1	0.0.0.0	127.255.255.255	2,147,483,648
0.0.0.0/0	0.0.0.0	255.255.255.255	4,294,967,296
131.174.0.0/16	131.174.0.0	131.174.255.255	2 <sup>16</sup>
131.174.16.128/26	131.174.16.128	131.174.16.191	2 <sup>5</sup>
145.116.128.0/18	145.116.128.0	145.116.191.255	16,384

<https://www.ipconvertertools.com/convert-cidr-manually-binary>

#### exercise 1b

127.0.0.0/8 is used for loopback addresses.

Any datagram from higher level protocols sent to an address somewhere inside of this block of addresses will loop back inside the host.

127.0.0.1 leads to the localhost.

#### exercise 1c

These are all private local addresses.

CLASS A: 10 range

CLASS B: 172 range

CLASS C: 192 range

These addresses are not unique and non routable

These addresses can be used by private networks

#### exercise 1d

A broadcast address is an address that broadcasts a message to all hosts on the network.

The broadcast address is 172.21.153.255

#### exercise 1e

CIDR	range start	range end (inclusive)	#addresses
2a01:4f8:231:3ac7:2702::/80	2a01:4f8:231:3ac7:2702::		
2a01:4f8:231:3ac7:2702:ffff:ffff:ffff			2 <sup>48</sup>
::1/128	0000:0000:0000:0000:0000:0000:0000:0001		
0000:0000:0000:0000:0000:0000:0000:0001			1
fe80::/10	FE80:0000:0000:0000:0000:0000:0000:0000		
FEBF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF			
332,306,998,946,228,968,225,951,765,070,086,144			
2001:db8:a800::/42	2001:0DB8:A800:0000:0000:0000:0000:0000		
2001:0DB8:A83F:FFFF:FFFF:FFFF:FFFF:FFFF			77,371,252,455,336,267,181,195,264
::ffff:131.174.0.0/112	::ffff:83ae:0	::ffff:83ae:ffff	65,536
2606:4700:4700::/48	2606:4700:4700::	2606:4700:4700:ffff:ffff:ffff:ffff:ffff	
1,208,925,819,614,629,174,706,176			

2a07:3506:4c:3200::/55      2a07:3506:4c:3200::      2a07:3506:4c:33ff:ffff:ffff:ffff:ffff  
9,444,732,965,739,290,427,392

#### exercise 1f

The 169.254.0.0/16 and fe80::/10 addresses are self assigned link-local addresses in the network.

They are used to connect with other hosts within the same subnet on the condition that there is no external configuration of addresses. We advice to not use them if possible as receiving them might be irritating/frustrating.

#### exercise 1g

They are IPV6 unique local addresses.

This means that they can be used inside an company at multiple sites.

They begin with 7 bit, or more exact 1111 110L.

The equivalent IPV4 address range are privata addresses so:

10.0. 0.0/8 IP addresses: 10.0. 0.0 – 10.255. 255.255.

172.16. 0.0/12 IP addresses: 172.16. 0.0 – 172.31. 255.255.

192.168. 0.0/16 IP addresses: 192.168. 0.0 – 192.168. 255.255.

#### exercise 1h

The unique local addresses (1g) can be routed, but the link-local addresses (1f) can not.

Unique local addresses must be manually assigned, link-local addresses are automaticly generated.

#### exercise 1i

Instead of using a broadcast, we can use a link-local mutlicast group, this group addresses all hosts within the given subnet. The traffic that is sent to the address of the group is then sent to all subscribers of the multicast group.

#### exercise 1j

32 bit =  $2^{32}$  combinations possible

128 bit =  $2^{128}$  combinations possible

$(2^{128} / 2^{32}) / 365 = 2.17e26$  years

#### exercise 1k

address space is  $(16^4)^5 = 1,208e24$  combinations possible

$(2^{128}/1.208e24) / 365 = 9.9e34$  years

#### exercise 2a

The maximum number is 10, were each router has its own subnet (so 4 subnets) and each connecting between the routers (which are 6 if you connect every router).

#### exercise 2b

223.1.17.0/26, 223.1.17.128/25 and 223.1.17.64/28

exercise 5

[https://github.com/joostgrunwald/networks\\_and\\_security/blob/main/sniffer\\_start.py](https://github.com/joostgrunwald/networks_and_security/blob/main/sniffer_start.py)