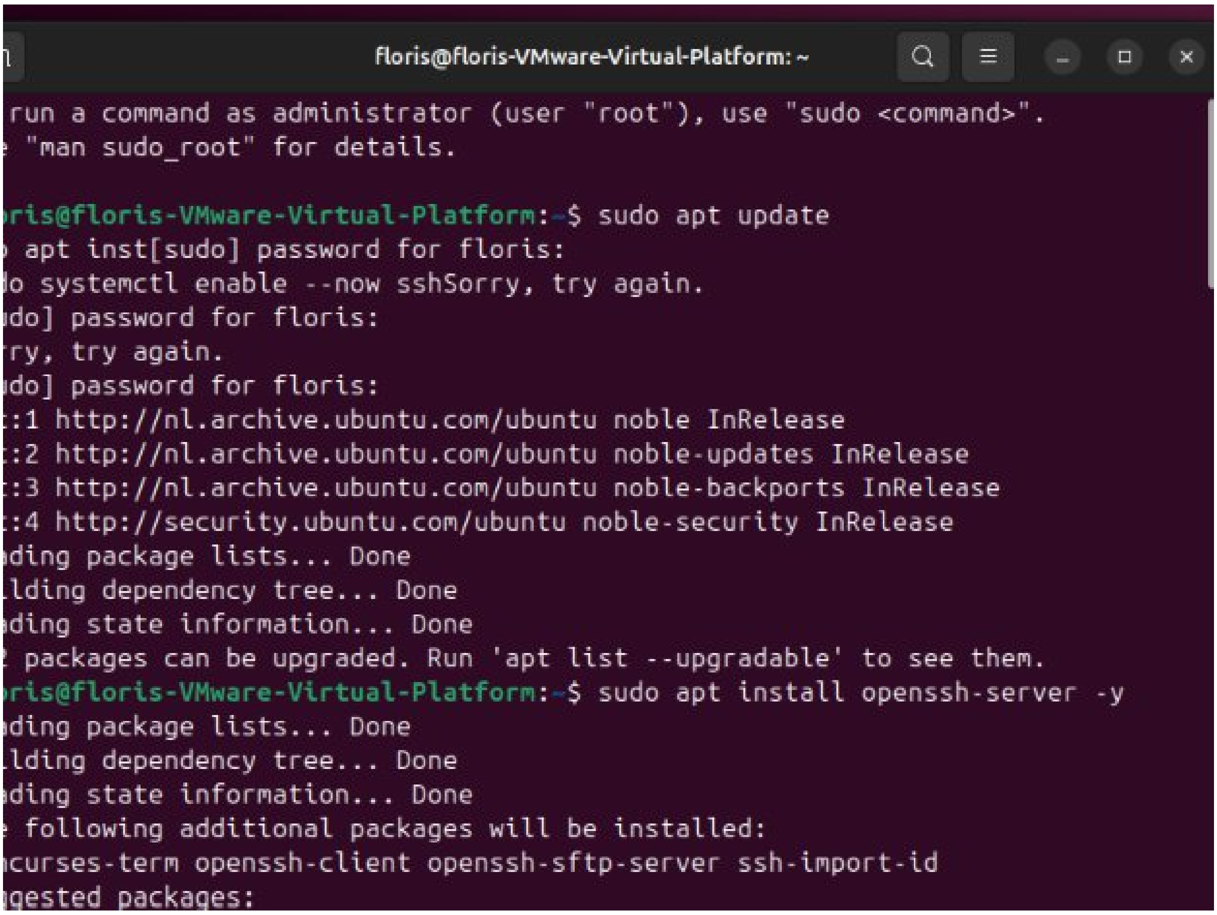
Template Week 6 – Networking

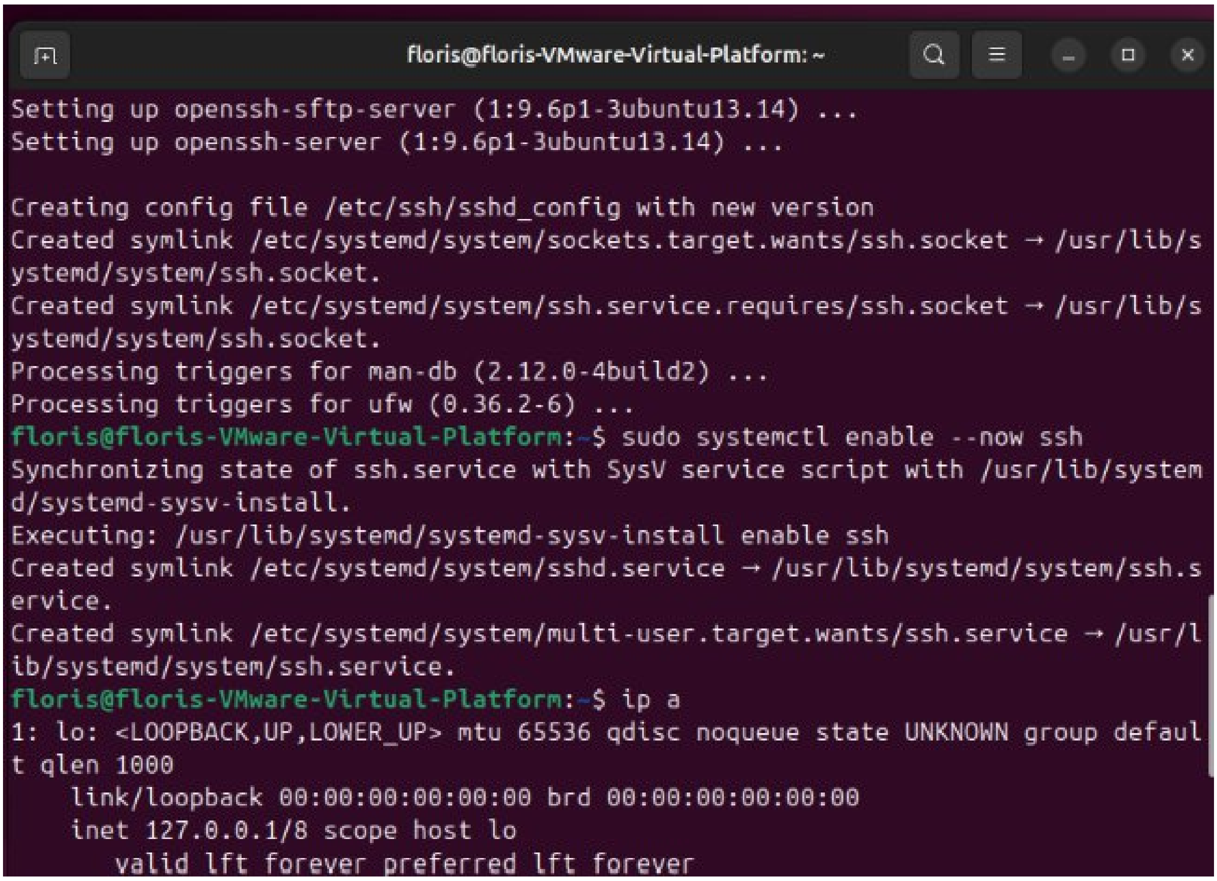
Student number: 588734

Assignment 6.1: Working from home

Screenshot installation openssh-server:

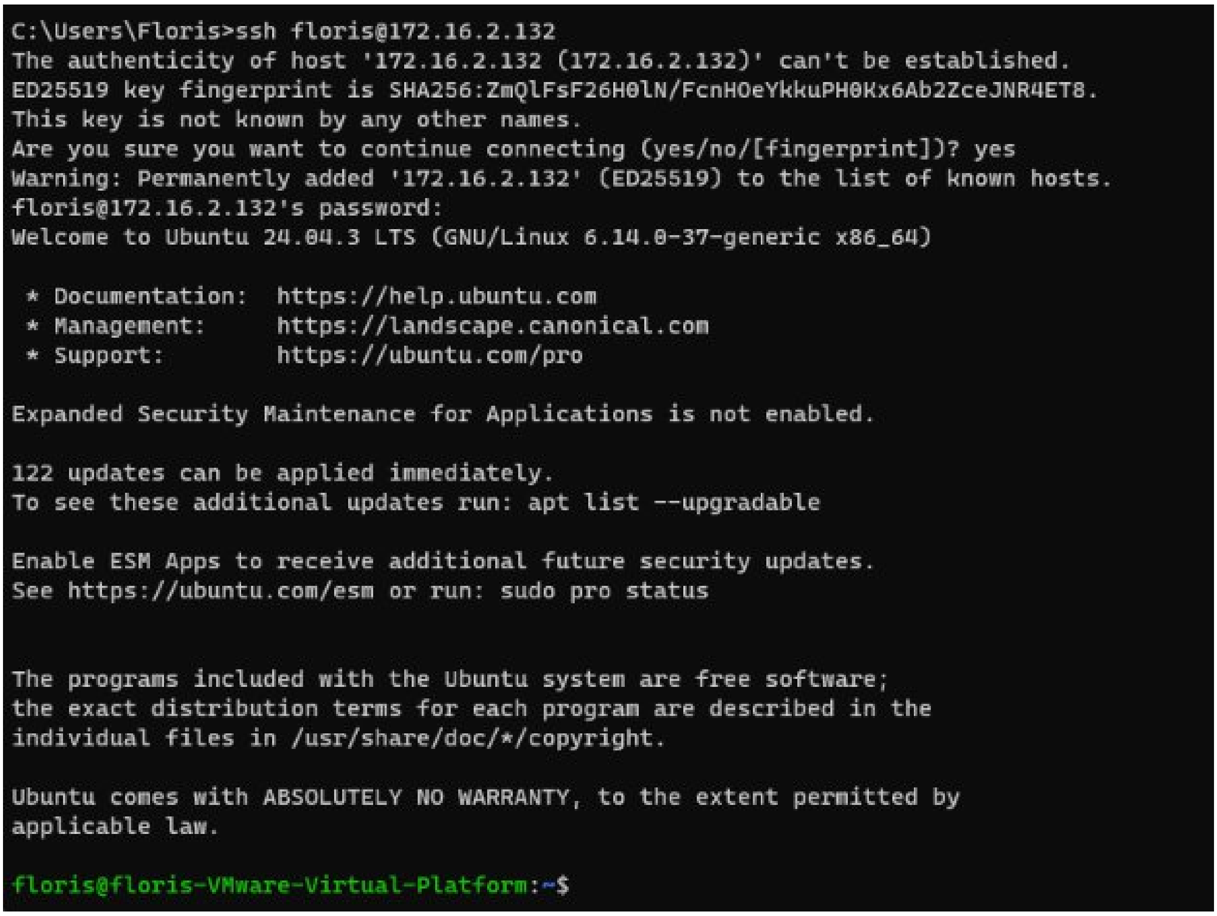


```
 run a command as administrator (user "root"), use "sudo <command>".
e "man sudo_root" for details.

oris@floris-VMware-Virtual-Platform:~$ sudo apt update
o apt inst[sudo] password for floris:
do systemctl enable --now sshSorry, try again.
udo] password for floris:
rry, try again.
udo] password for floris:
t:1 http://nl.archive.ubuntu.com/ubuntu noble InRelease
t:2 http://nl.archive.ubuntu.com/ubuntu noble-updates InRelease
t:3 http://nl.archive.ubuntu.com/ubuntu noble-backports InRelease
t:4 http://security.ubuntu.com/ubuntu noble-security InRelease
ading package lists... Done
ilding dependency tree... Done
ading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
oris@floris-VMware-Virtual-Platform:~$ sudo apt install openssh-server -y
ading package lists... Done
ilding dependency tree... Done
ading state information... Done
e following additional packages will be installed:
ncurses-term openssh-client openssh-sftp-server ssh-import-id
ggested packages:
```



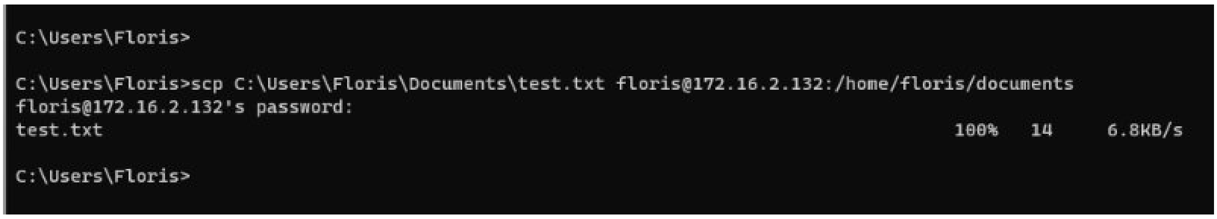
```
Setting up openssh-sftp-server (1:9.6p1-3ubuntu13.14) ...
Setting up openssh-server (1:9.6p1-3ubuntu13.14) ...

Creating config file /etc/ssh/sshd_config with new version
Created symlink /etc/systemd/system/sockets.target.wants/ssh.socket → /usr/lib/s
ystemd/system/ssh.socket.
Created symlink /etc/systemd/system/ssh.service.requires/ssh.socket → /usr/lib/s
ystemd/system/ssh.socket.
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for ufw (0.36.2-6) ...
floris@floris-VMware-Virtual-Platform:~$ sudo systemctl enable --now ssh
Synchronizing state of ssh.service with SysV service script with /usr/lib/system
d/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
Created symlink /etc/systemd/system/sshd.service → /usr/lib/systemd/system/ssh.s
ervice.
Created symlink /etc/systemd/system/multi-user.target.wants/ssh.service → /usr/l
ib/systemd/system/ssh.service.
floris@floris-VMware-Virtual-Platform:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
```

Screenshot successful SSH command execution:



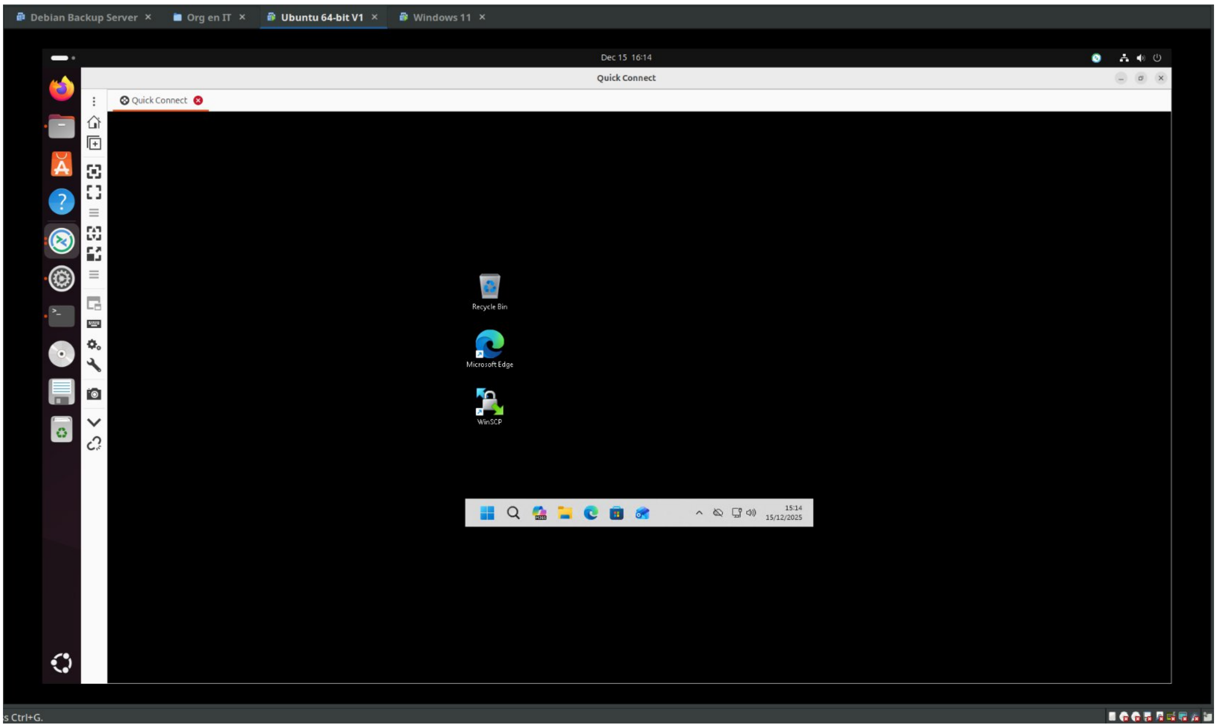
```
C:\Users\Floris>ssh floris@172.16.2.132
The authenticity of host '172.16.2.132 (172.16.2.132)' can't be established.
ED25519 key fingerprint is SHA256:ZmQlFsF26H0lN/FcnHOeYkkuPH0Kx6Ab2ZceJNR4ET8.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '172.16.2.132' (ED25519) to the list of known hosts.
floris@172.16.2.132's password:
Welcome to Ubuntu 24.04.3 LTS (GNU/Linux 6.14.0-37-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.

122 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

floris@floris-VMware-Virtual-Platform:~$
```

Screenshot successful execution SCP command:



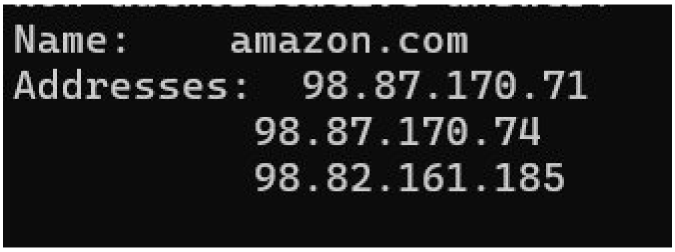
```
C:\Users\Floris>

C:\Users\Floris>scp C:\Users\Floris\Documents\test.txt floris@172.16.2.132:/home/floris/documents
floris@172.16.2.132's password:
test.txt                                                                      100%   14     6.8KB/s

C:\Users\Floris>
```

Screenshot remmina:

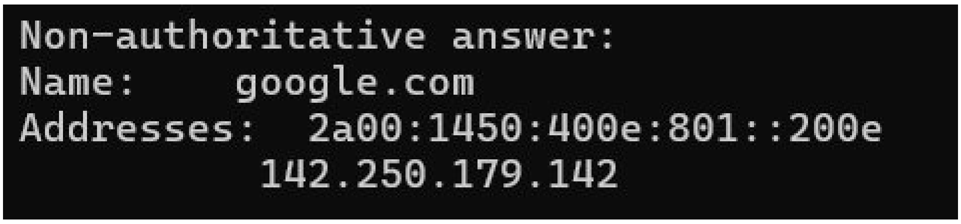


Assignment 6.2: IP addresses websites

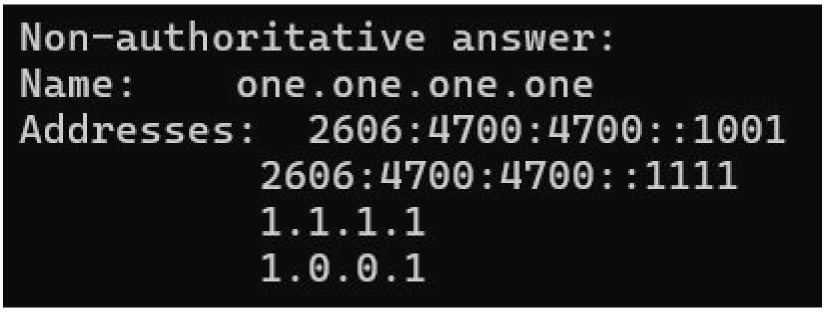
Relevant screenshots nslookup command:



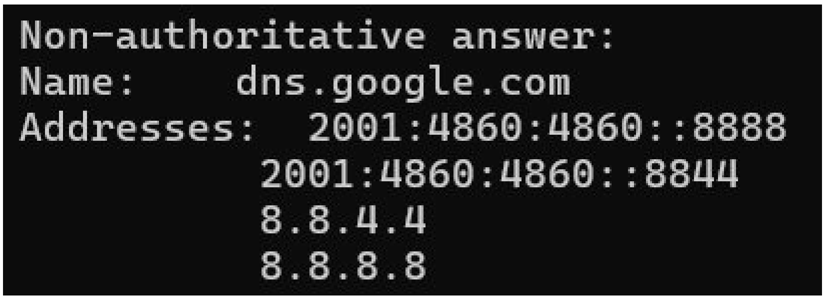
```
Name:    amazon.com
Addresses:  98.87.170.71
          98.87.170.74
          98.82.161.185
```



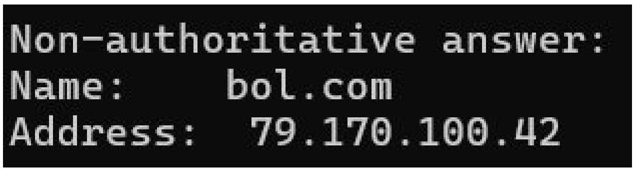
```
Non-authoritative answer:
Name:    google.com
Addresses:  2a00:1450:400e:801::200e
          142.250.179.142
```



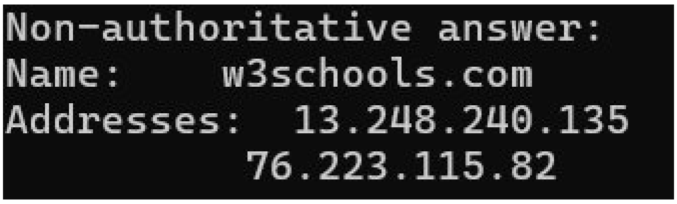
```
Non-authoritative answer:
Name:    one.one.one.one
Addresses:  2606:4700:4700::1001
          2606:4700:4700::1111
          1.1.1.1
          1.0.0.1
```



```
Non-authoritative answer:
Name:    dns.google.com
Addresses:  2001:4860:4860::8888
          2001:4860:4860::8844
          8.8.4.4
          8.8.8.8
```

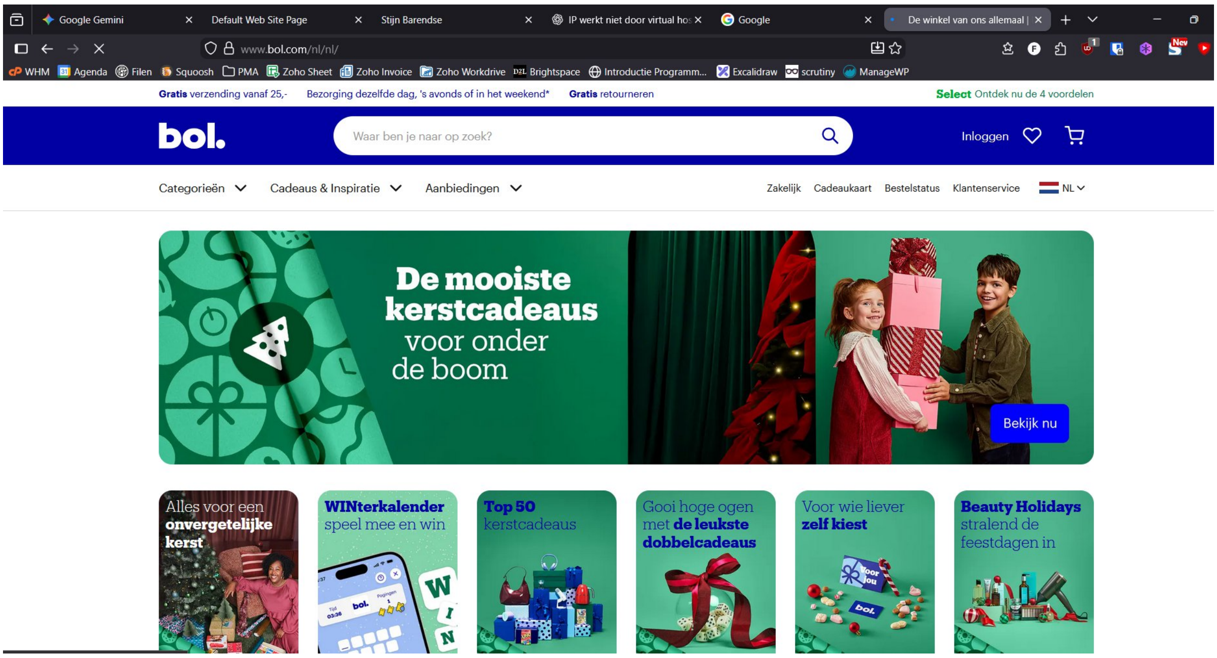


```
Non-authoritative answer:
Name:    bol.com
Address:  79.170.100.42
```



```
Non-authoritative answer:
Name:    w3schools.com
Addresses:  13.248.240.135
          76.223.115.82
```

Screenshot website visit via IP address:


Google Gemini
Default Web Site Page
Stijn Barendse
IP werkt niet door virtual hos
Google
De winkel van ons allemaal |
www.bol.com/nl/nl/
WHM
Agenda
Filen
Squoosh
PMA
Zoho Sheet
Zoho Invoice
Zoho Workdrive
Brightspace
Introductie Programm...
Excalidraw
scrutiny
ManageWP
Gratis verzending vanaf 25,-
Bezorging dezelfde dag, 's avonds of in het weekend*
Gratis retourneren
Select Ontdek nu de 4 voordelen
bol.
Waar ben je naar op zoek?
Inloggen
Categorieën
Cadeaus & Inspiratie
Aanbiedingen
Zakelijk
Cadeaukaart
Bestelstatus
Klantenservice
NL
De mooiste kerstcadeaus voor onder de boom
Bekijk nu
Alles voor een onvergetelijke kerst
WINterkalender speel mee en win
Top 50 kerstcadeaus
Gooi hoge ogen met de leukste dobbelcadeaus
Voor wie liever zelf kiest
Beauty Holidays stralend de feestdagen in

Ik kreeg eerst een beveilegingsmelding en werdt daarna doorverwezen naar de bol.com domein.

Assignment 6.3: subnetting

How many IP addresses are in this network configuration 192.168.110.128/25?

32 – 25 = 7bits. 2 tot de macht 7 = 128 ip adressen.

What is the usable IP range to hand out to the connected computers?

128 – 2 = 126 bruikbare ip adressen

Check your two previous answers with this Linux command: `ipcalc 192.168.110.128/25`

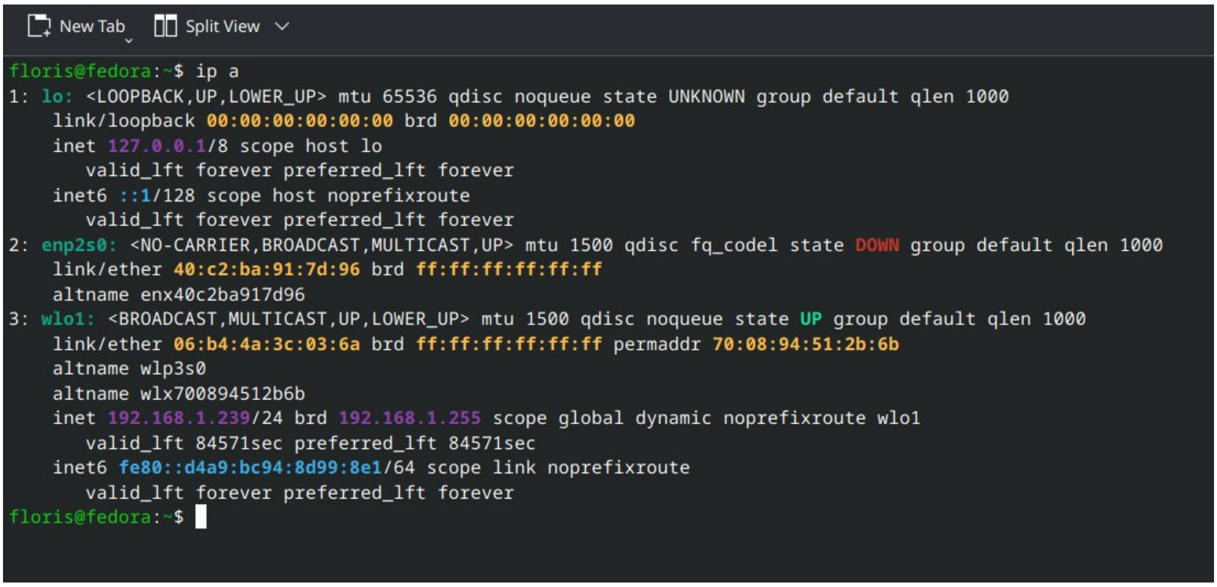
```
floris@fedora:~$ ipcalc 192.168.110.128/25
Network:        192.168.110.128/25
Netmask:        255.255.255.128 = 25
Broadcast:      192.168.110.255

Address space:  Private Use
HostMin:        192.168.110.129
HostMax:        192.168.110.254
Hosts/Net:      126
floris@fedora:~$
```

Hij laat de minimale en maximale range zien, ook toont hij hoeveel ip adressen daarop bruikbaar zijn.

Explain the above calculation in your own words.

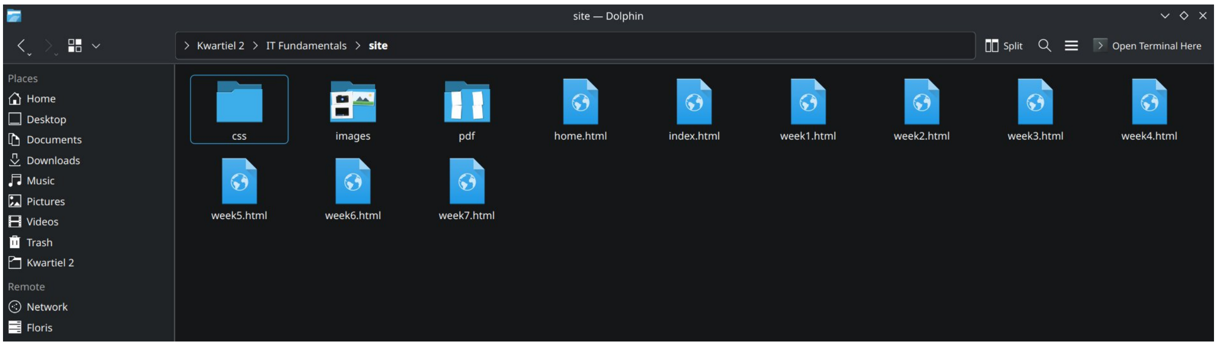
Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

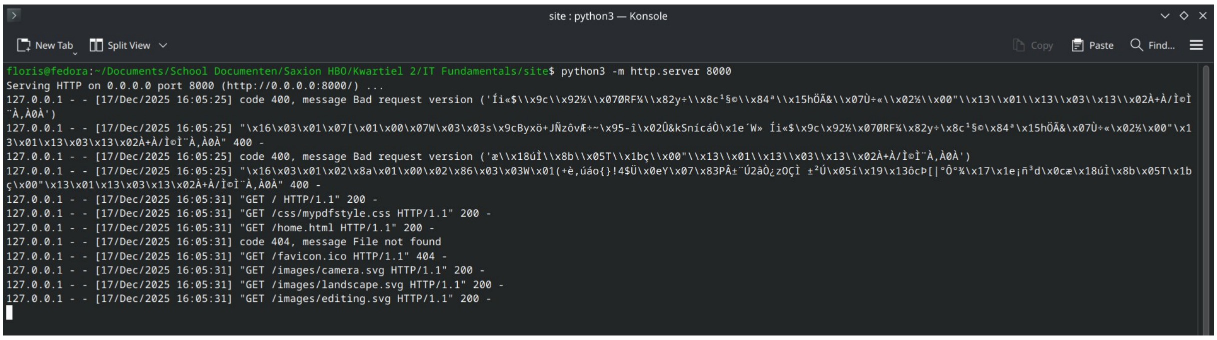


```
floris@fedora:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: enp2s0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc fq_codel state DOWN group default qlen 1000
    link/ether 40:c2:ba:91:7d:96 brd ff:ff:ff:ff:ff:ff
    altname enx40c2ba917d96
3: wlo1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default qlen 1000
    link/ether 06:b4:4a:3c:03:6a brd ff:ff:ff:ff:ff:ff permaddr 70:08:94:51:2b:6b
    altname wlp3s0
    altname wlx700894512b6b
    inet 192.168.1.239/24 brd 192.168.1.255 scope global dynamic noprefixroute wlo1
       valid_lft 84571sec preferred_lft 84571sec
    inet6 fe80::d4a9:bc94:8d99:8e1/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
floris@fedora:~$
```

Screenshot of Site directory contents:

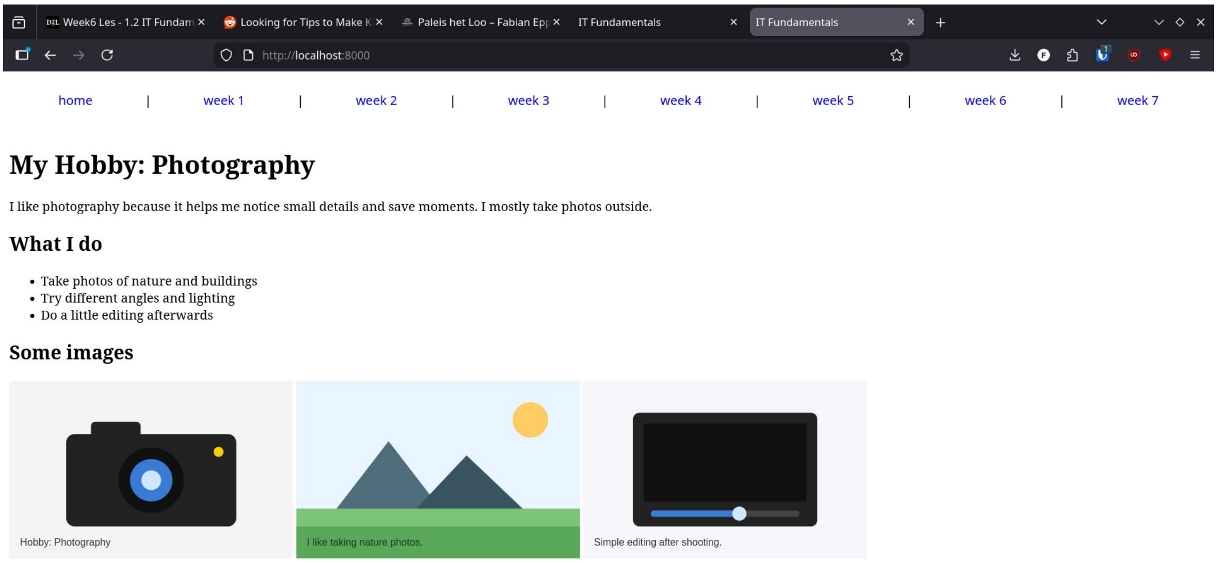


Screenshot python3 webserver command:



```
floris@fedora:~/Documents/School Documenten/Saxion HBO/Kwartiel 2/IT Fundamentals/site$ python3 -m http.server 8000
Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
127.0.0.1 - - [17/Dec/2025 16:05:25] code 400, message Bad request version ('Íi«$\\x9c\\x92½\\x07ØRF¼\\x82y÷\\x8c¹§©\\x84ª\\x15hÖÃ&\\x07Ù÷«\\x02½\\x00"\\x13\\x01\\x13\\x03\\x13\\x02À+À/Ì©Ì
¨À,À0À')
127.0.0.1 - - [17/Dec/2025 16:05:25] "\x16\x03\x01\x07[\x01\x00\x07W\x03\x03s\x9cByxö+JÑzôvÆ÷~\x95-î\x02Û&kSnícáÒ\x1e´W» Íi«$\x9c\x92½\x07ØRF¼\x82y÷\x8c¹§©\x84ª\x15hÖÃ&\x07Ù÷«\x02½\x00"\x1
3\x01\x13\x03\x13\x02À+À/Ì©Ì¨À,À0À" 400 -
127.0.0.1 - - [17/Dec/2025 16:05:25] code 400, message Bad request version ('æ\\x18úÌ\\x8b\\x05T\\x1bç\\x00"\\x13\\x01\\x13\\x03\\x13\\x02À+À/Ì©Ì¨À,À0À')
127.0.0.1 - - [17/Dec/2025 16:05:25] "\x16\x03\x01\x02\x8a\x01\x00\x02\x86\x03\x03W\x01(+è,úáo{}!4$Ü\x0eY\x07\x83PÂ±¨Ú2âÒ¿zOÇÌ ±²Ú\x05í\x19\x13ôcÞ[|°Ô°¾\x17\x1e¡ñ³d\x0cæ\x18úÌ\x8b\x05T\x1b
ç\x00"\x13\x01\x13\x03\x13\x02À+À/Ì©Ì¨À,À0À" 400 -
127.0.0.1 - - [17/Dec/2025 16:05:31] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [17/Dec/2025 16:05:31] "GET /css/mypdfstyle.css HTTP/1.1" 200 -
127.0.0.1 - - [17/Dec/2025 16:05:31] "GET /home.html HTTP/1.1" 200 -
127.0.0.1 - - [17/Dec/2025 16:05:31] code 404, message File not found
127.0.0.1 - - [17/Dec/2025 16:05:31] "GET /favicon.ico HTTP/1.1" 404 -
127.0.0.1 - - [17/Dec/2025 16:05:31] "GET /images/camera.svg HTTP/1.1" 200 -
127.0.0.1 - - [17/Dec/2025 16:05:31] "GET /images/landscape.svg HTTP/1.1" 200 -
127.0.0.1 - - [17/Dec/2025 16:05:31] "GET /images/editing.svg HTTP/1.1" 200 -
```

Screenshot web browser visits your site


Week6 Les - 1.2 IT Fundam
Looking for Tips to Make K
Paleis het Loo – Fabian Epp
IT Fundamentals
IT Fundamentals
http://localhost:8000

home | week 1 | week 2 | week 3 | week 4 | week 5 | week 6 | week 7

My Hobby: Photography

I like photography because it helps me notice small details and save moments. I mostly take photos outside.

What I do

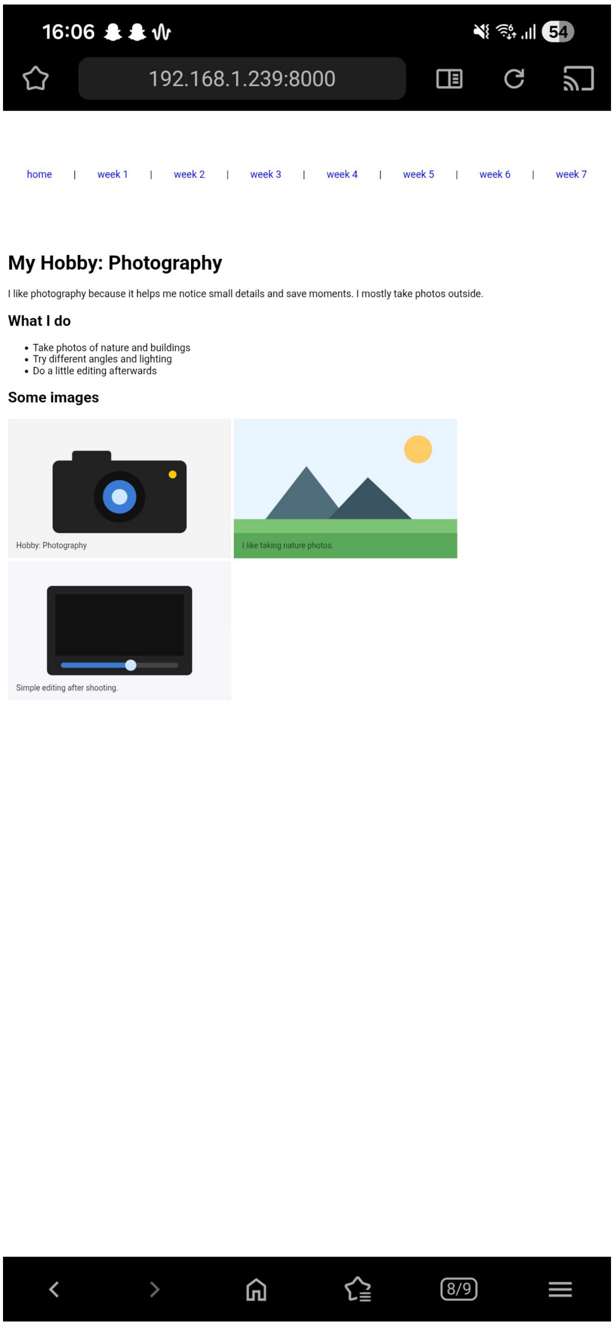
- Take photos of nature and buildings
- Try different angles and lighting
- Do a little editing afterwards

Some images

Hobby: Photography

I like taking nature photos.

Simple editing after shooting.



home | week 1 | week 2 | week 3 | week 4 | week 5 | week 6 | week 7

My Hobby: Photography

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Some images

Hobby: Photography

I like taking nature photos.

Simple editing after shooting.

Assignment 6.5: Network segment

Remember that bitwise java application you've made in week 2? Expand that application so that you can also calculate a network segment as explained in the PowerPoint slides of week 6. Use the bitwise & AND operator. You need to be able to input two Strings. An IP address and a subnet.

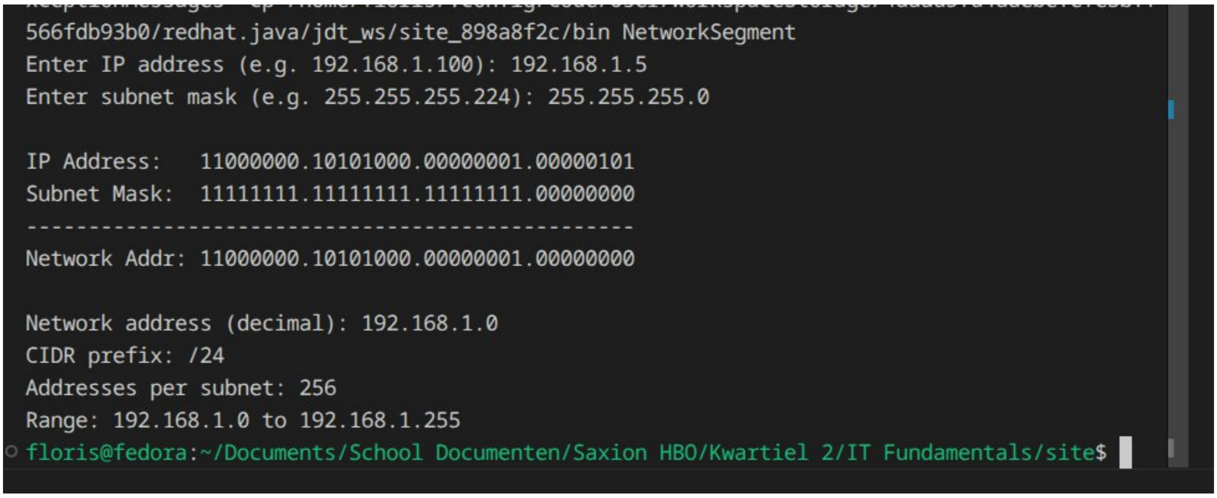
IP: 192.168.1.100 and subnet: 255.255.255.224 for /27

```
Example: 192.168.1.100/27
Calculate the network segment
IP Address:   11000000.10101000.00000001.01100100
```

```
Subnet Mask:  11111111.11111111.11111111.11100000
-----------------------------------------------
Network Addr: 11000000.10101000.00000001.01100000
```

This gives 192.168.1.96 in decimal as the network address.
For a /27 subnet, each segment (or subnet) has 32 IP addresses (2^5). The range of this network segment is from 192.168.1.96 to 192.168.1.127.

Paste source code here, with a screenshot of a working application.



```
566fdb93b0/redhat.java/jdt_ws/site_898a8f2c/bin NetworkSegment
Enter IP address (e.g. 192.168.1.100): 192.168.1.5
Enter subnet mask (e.g. 255.255.255.224): 255.255.255.0

IP Address:   11000000.10101000.00000001.00000101
Subnet Mask:  11111111.11111111.11111111.00000000
-----------------------------------------------
Network Addr: 11000000.10101000.00000001.00000000

Network address (decimal): 192.168.1.0
CIDR prefix: /24
Addresses per subnet: 256
Range: 192.168.1.0 to 192.168.1.255
floris@fedora:~/Documents/School Documenten/Saxion HBO/Kwartiel 2/IT Fundamentals/site$
```

```java
import java.util.Scanner;


public class NetworkSegment {
    public static void main(String[] args) {
        String ip = args.length >= 1 ? args[0] : prompt("Enter IP address (e.g. 192.168.1.100): ");
        String mask = args.length >= 2 ? args[1] : prompt("Enter subnet mask (e.g.
255.255.255.224): ");


        int ipInt = ipv4(ip);
        int maskInt = ipv4(mask);
        int netInt = ipInt & maskInt;
        int bcastInt = netInt | ~maskInt;


        System.out.println();
        System.out.println("IP Address:   " + bin(ipInt));
        System.out.println("Subnet Mask:  " + bin(maskInt));
        System.out.println("------------------------------------------------");

        System.out.println("Network Addr: " + bin(netInt));

        System.out.println();

        System.out.println("Network address (decimal): " + dec(netInt));


        Integer prefix = cidrPrefix(maskInt);

        if (prefix != null) {

            System.out.println("CIDR prefix: /" + prefix);

            System.out.println("Addresses per subnet: " + (1 << (32 - prefix)));

        }


        System.out.println("Range: " + dec(netInt) + " to " + dec(bcastInt));

    }


    @SuppressWarnings("resource")

    private static String prompt(String msg) {

        System.out.print(msg);

        return new Scanner(System.in).nextLine().trim();

    }


    private static int ipv4(String s) {

        String[] p = s.split("\\.");

        if (p.length != 4) throw new IllegalArgumentException("Invalid IPv4: " + s);

        int v = 0;

        for (String part : p) {

            int o = Integer.parseInt(part);

            if (o < 0 || o > 255) throw new IllegalArgumentException("Invalid IPv4: " + s);

            v = (v << 8) | o;

        }

        return v;

    }
    private static String dec(int v) {
        return ((v >>> 24) & 255) + "." + ((v >>> 16) & 255) + "." + ((v >>> 8) & 255) + "." + (v & 255);
    }

    private static String bin(int v) {
        return b8((v >>> 24) & 255) + "." + b8((v >>> 16) & 255) + "." + b8((v >>> 8) & 255) + "." + b8(v & 255);
    }

    private static String b8(int o) {
        return String.format("%8s", Integer.toBinaryString(o)).replace(' ', '0');
    }

    // /prefix only when mask is contiguous 1s then 0s.
    private static Integer cidrPrefix(int mask) {
        boolean zero = false;
        int p = 0;
        for (int bit = 31; bit >= 0; bit--) {
            boolean one = ((mask >>> bit) & 1) == 1;
            if (!zero) {
                if (one) p++; else zero = true;
            } else if (one) {
                return null;
            }
        }
        return p;
    }
}
```

Ready? Save this file and export it as a pdf file with the name: **week6.pdf**