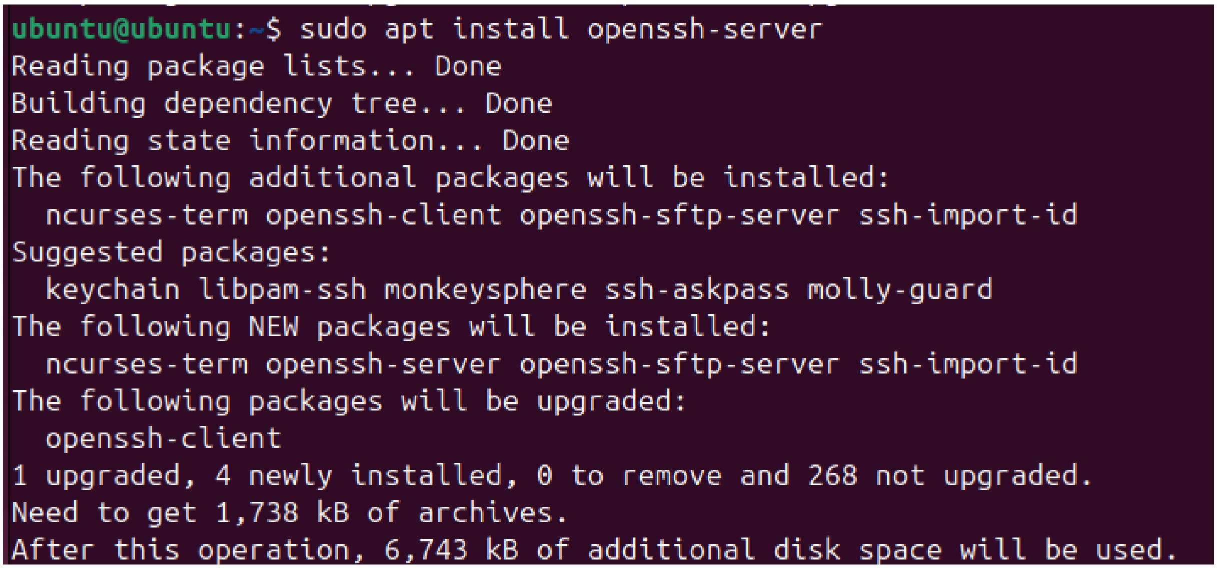
Week 6 – Networking

Student number: 579444

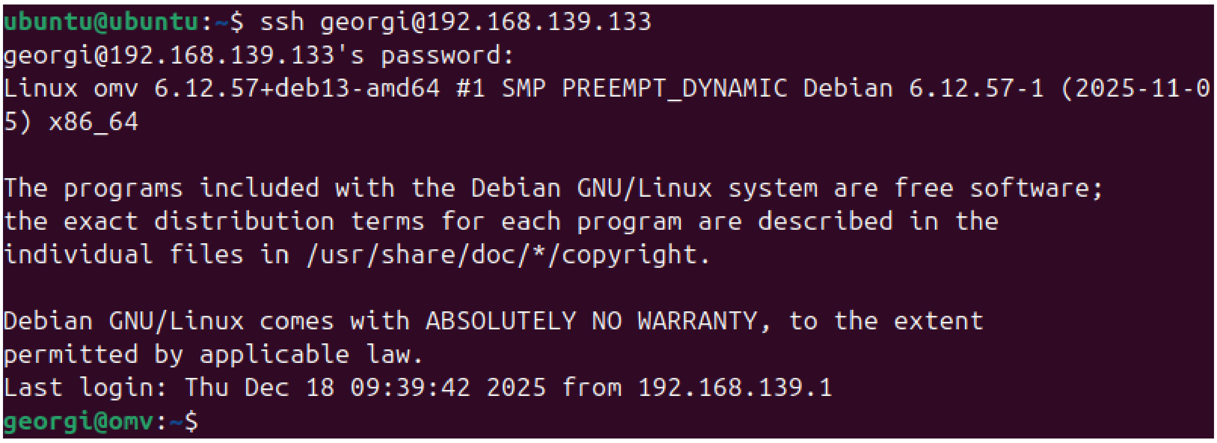
Assignment 6.1: Working from home

Screenshot installation openssh-server:



```
ubuntu@ubuntu:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-client openssh-sftp-server ssh-import-id
Suggested packages:
  keychain libpam-ssh monkeysphere ssh-askpass molly-guard
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
The following packages will be upgraded:
  openssh-client
1 upgraded, 4 newly installed, 0 to remove and 268 not upgraded.
Need to get 1,738 kB of archives.
After this operation, 6,743 kB of additional disk space will be used.
```

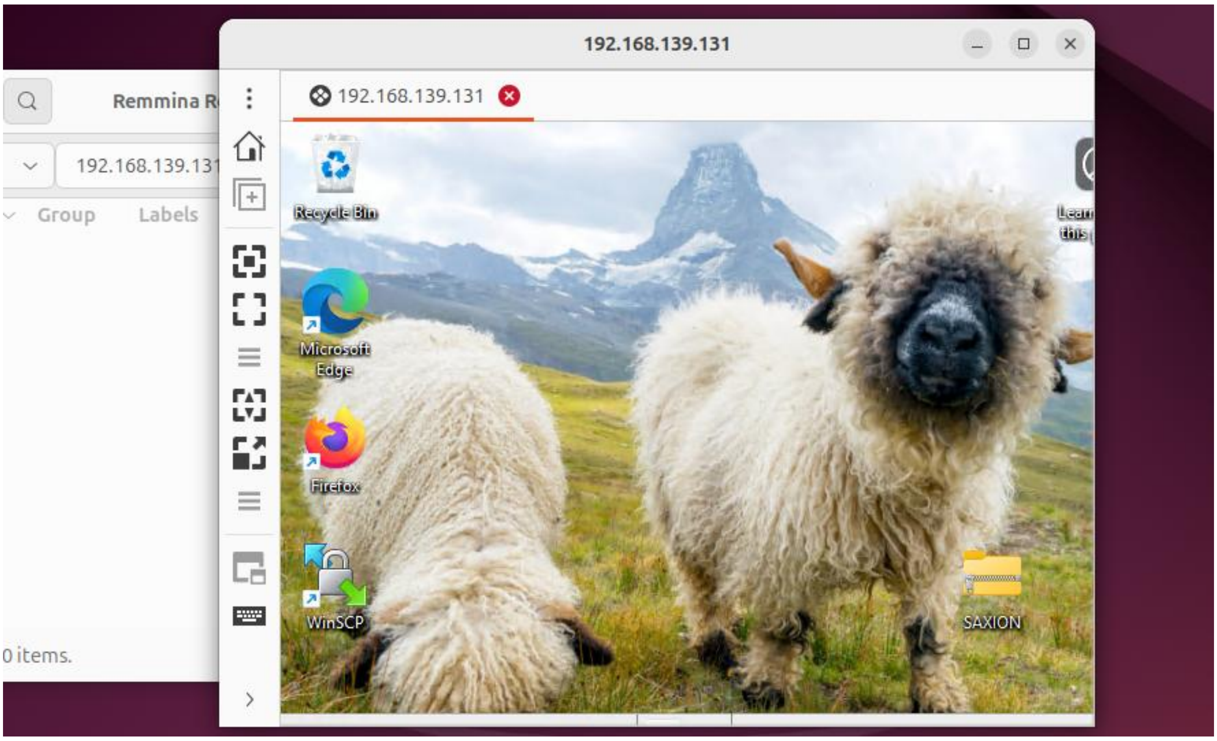
Screenshot successful SSH command execution:



```
ubuntu@ubuntu:~$ ssh georgi@192.168.139.133
georgi@192.168.139.133's password:
Linux omv 6.12.57+deb13-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.12.57-1 (2025-11-0
5) x86_64

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

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu Dec 18 09:39:42 2025 from 192.168.139.1
georgi@omv:~$
```

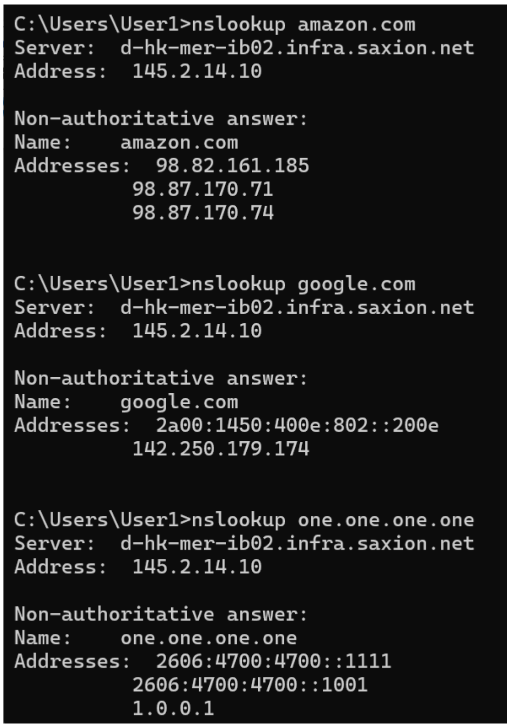
Screenshot successful execution SCP command:

Screenshot remmina:

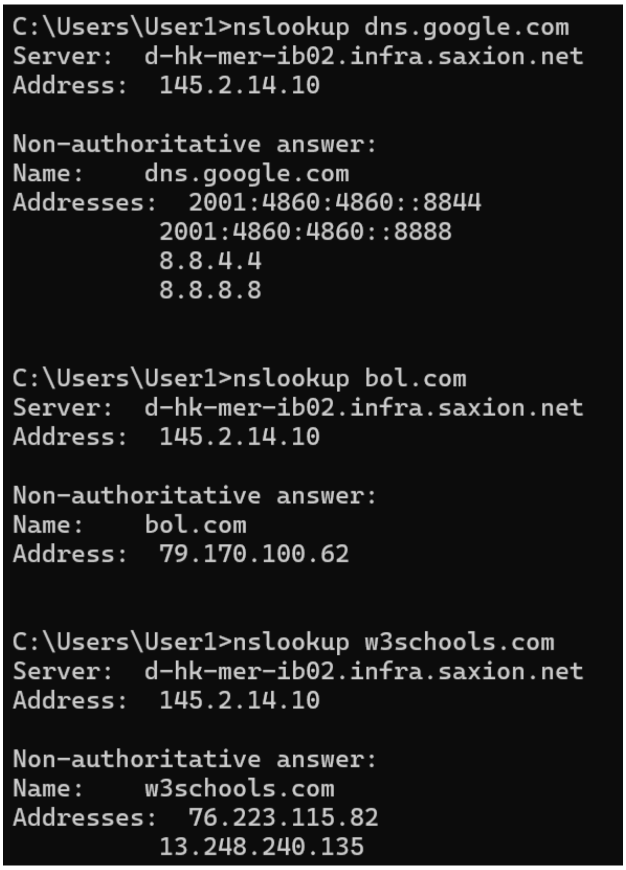


Assignment 6.2: IP addresses websites

Relevant screenshots nslookup command:

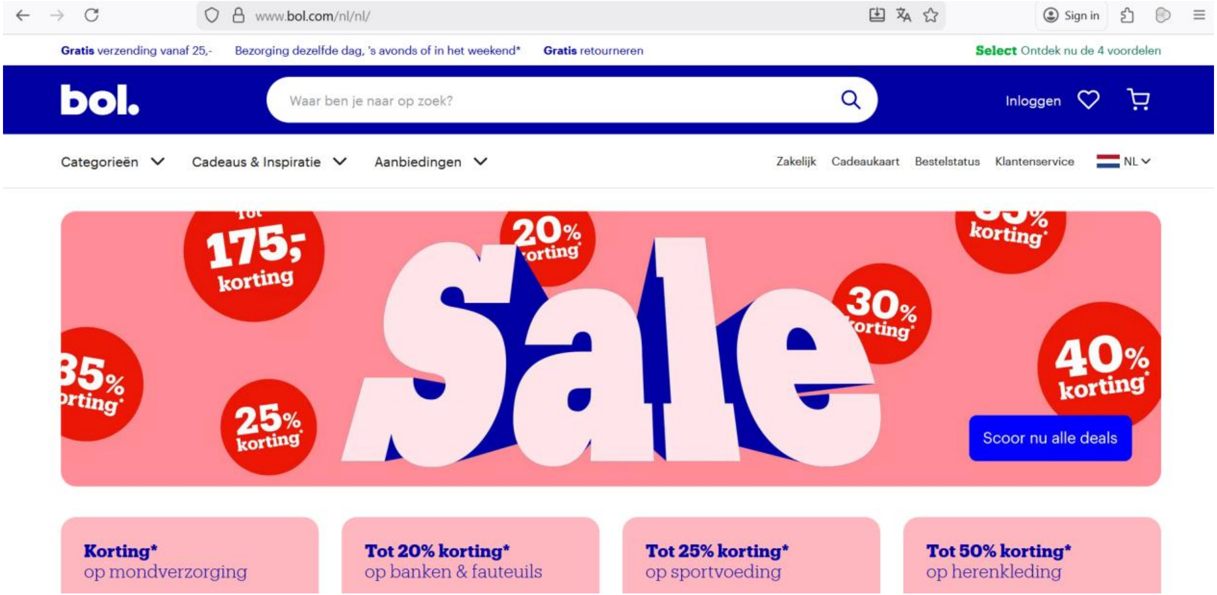


```
C:\Users\User1>nslookup amazon.com
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

Non-authoritative answer:
Name:    amazon.com
Addresses:  98.82.161.185
          98.87.170.71
          98.87.170.74


C:\Users\User1>nslookup google.com
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

Non-authoritative answer:
Name:    google.com
Addresses:  2a00:1450:400e:802::200e
          142.250.179.174


C:\Users\User1>nslookup one.one.one.one
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

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



```
C:\Users\User1>nslookup dns.google.com
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

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


C:\Users\User1>nslookup bol.com
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

Non-authoritative answer:
Name:    bol.com
Address:  79.170.100.62


C:\Users\User1>nslookup w3schools.com
Server:  d-hk-mer-ib02.infra.saxion.net
Address:  145.2.14.10

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

Screenshot website visit via IP address:


www.bol.com/nl/nl/
Sign in
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
175,- korting
20% korting
Sale
30% korting
40% korting
35% korting
25% korting
Scoor nu alle deals
Korting* op mondverzorging
Tot 20% korting* op banken & fauteuils
Tot 25% korting* op sportvoeding
Tot 50% korting* op herenkleding

Assignment 6.3: subnetting

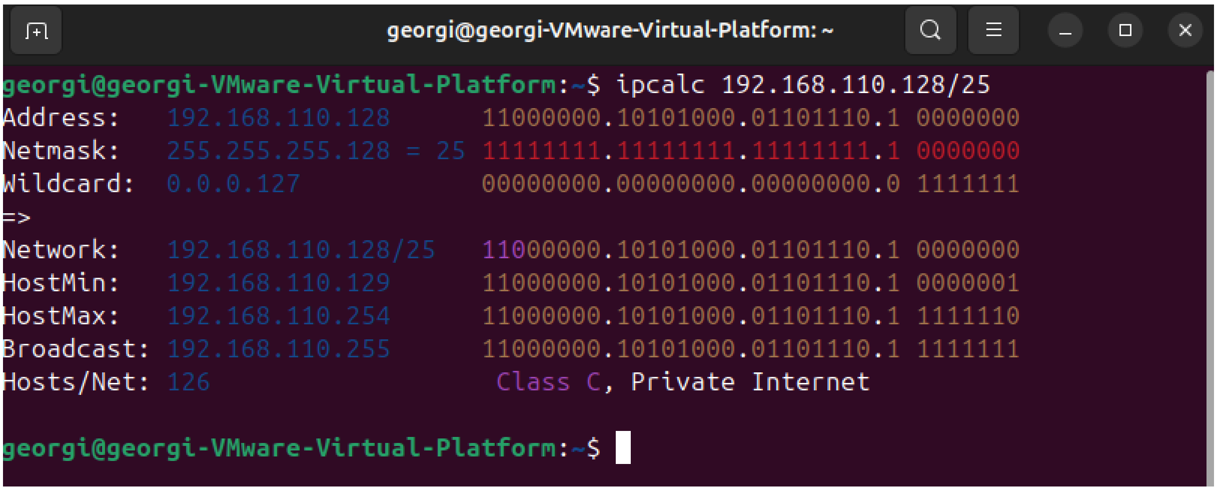
How many IP addresses are in this network configuration 192.168.110.128/25?

There are 128 IP addresses, because 32 – 25 = 7 bits = 2^7, but only 126 of them are usable, because the other 2 are for reserved for specific purposes (.128 and .255).

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

The usable IP range is 192.168.110.129 - 192.168.110.254

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

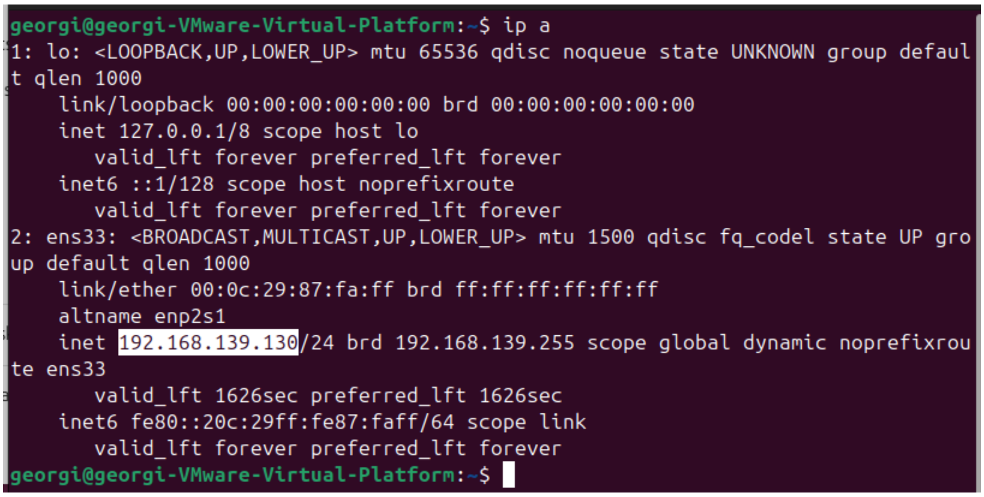


```
georgi@georgi-VMware-Virtual-Platform:~$ ipcalc 192.168.110.128/25
Address:   192.168.110.128       11000000.10101000.01101110.1 0000000
Netmask:   255.255.255.128 = 25 11111111.11111111.11111111.1 0000000
Wildcard:  0.0.0.127             00000000.00000000.00000000.0 1111111
=>
Network:   192.168.110.128/25    11000000.10101000.01101110.1 0000000
HostMin:   192.168.110.129       11000000.10101000.01101110.1 0000001
HostMax:   192.168.110.254       11000000.10101000.01101110.1 1111110
Broadcast: 192.168.110.255       11000000.10101000.01101110.1 1111111
Hosts/Net: 126                    Class C, Private Internet

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

Explain the above calculation in your own words.

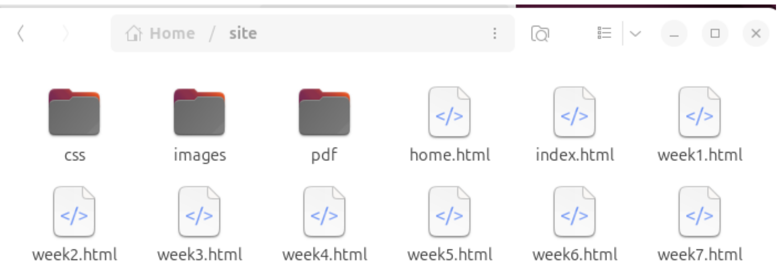
Assignment 6.4: HTML

Screenshot IP address Ubuntu VM:

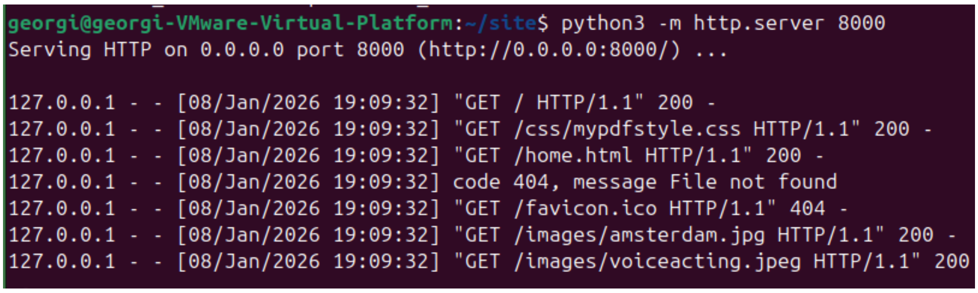


```
georgi@georgi-VMware-Virtual-Platform:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP gro
up default qlen 1000
    link/ether 00:0c:29:87:fa:ff brd ff:ff:ff:ff:ff:ff
    altname enp2s1
    inet 192.168.139.130/24 brd 192.168.139.255 scope global dynamic noprefixrou
te ens33
       valid_lft 1626sec preferred_lft 1626sec
    inet6 fe80::20c:29ff:fe87:faff/64 scope link
       valid_lft forever preferred_lft forever
georgi@georgi-VMware-Virtual-Platform:~$ 
```

Screenshot of Site directory contents:

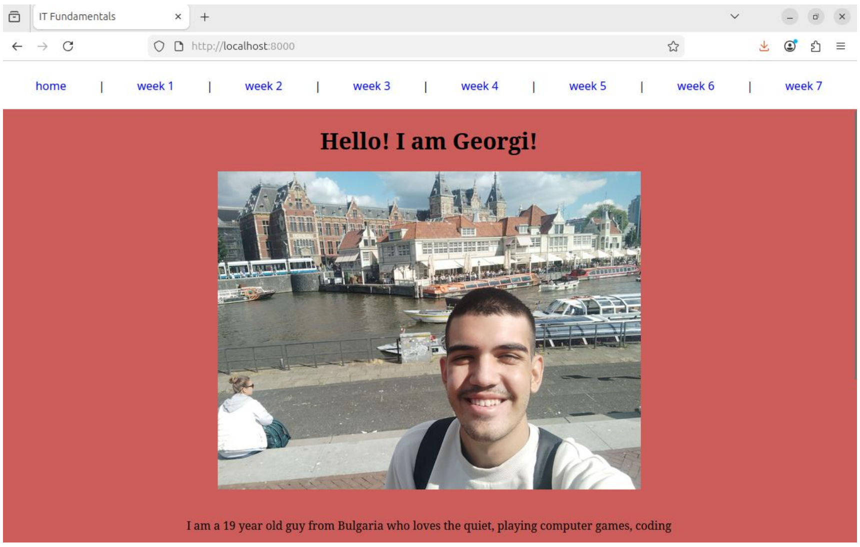


Screenshot python3 webserver command:



```
georgi@georgi-VMware-Virtual-Platform:~/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 - - [08/Jan/2026 19:09:32] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [08/Jan/2026 19:09:32] "GET /css/mypdfstyle.css HTTP/1.1" 200 -
127.0.0.1 - - [08/Jan/2026 19:09:32] "GET /home.html HTTP/1.1" 200 -
127.0.0.1 - - [08/Jan/2026 19:09:32] code 404, message File not found
127.0.0.1 - - [08/Jan/2026 19:09:32] "GET /favicon.ico HTTP/1.1" 404 -
127.0.0.1 - - [08/Jan/2026 19:09:32] "GET /images/amsterdam.jpg HTTP/1.1" 200 -
127.0.0.1 - - [08/Jan/2026 19:09:32] "GET /images/voiceacting.jpeg HTTP/1.1" 200
```

Screenshot web browser visits your site



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

Hello! I am Georgi!

I am a 19 year old guy from Bulgaria who loves the quiet, playing computer games, coding

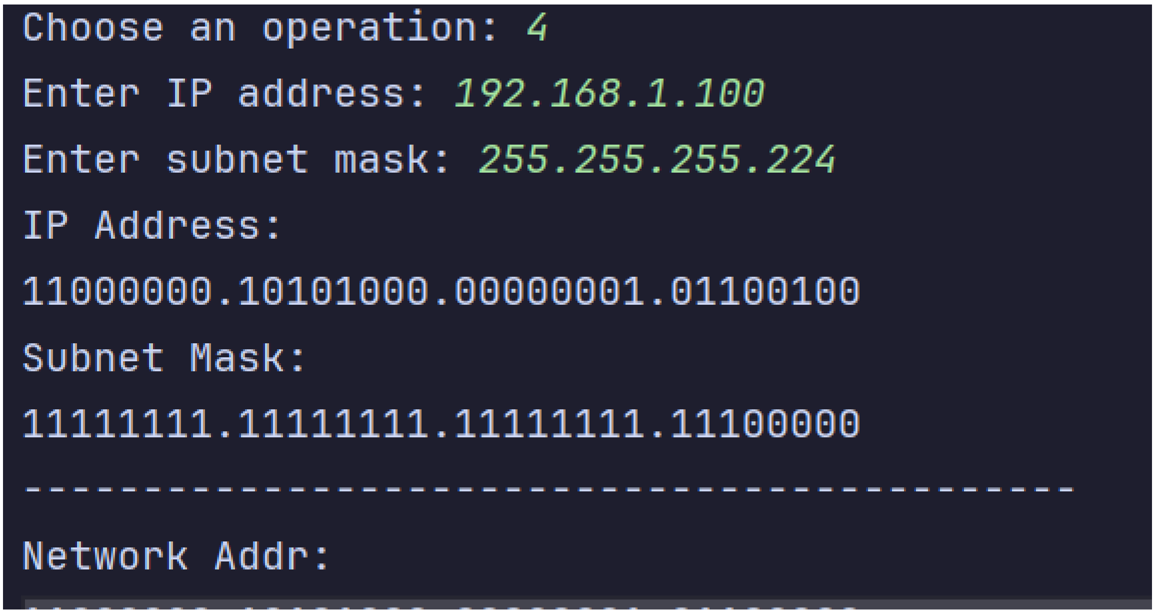
Assignment 6.5: Network segment

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.



```
Choose an operation: 4
Enter IP address: 192.168.1.100
Enter subnet mask: 255.255.255.224
IP Address:
11000000.10101000.00000001.01100100
Subnet Mask:
11111111.11111111.11111111.11100000
----------------------------------------
Network Addr:
```

```
public static void networkCalculator(String ip, String subnet) {

    String[] ipParts = ip.split("\\.");
    String[] subnetParts = subnet.split("\\.");

    int[] networkParts = new int[4];

    System.out.println("IP Address:   ");
    for (int i = 0; i < 4; i++) {
        int ipOctet = Integer.parseInt(ipParts[i]);
        System.out.print(toBinary(ipOctet));
        if (i < 3) System.out.print(".");
    }

    System.out.println("\nSubnet Mask: ");
    for (int i = 0; i < 4; i++) {
        int subnetOctet = Integer.parseInt(subnetParts[i]);
        System.out.print(toBinary(subnetOctet));
        if (i < 3) System.out.print(".");
    }

    System.out.println("\n------------------------------------------");

    System.out.println("Network Addr:");
    for (int i = 0; i < 4; i++) {
        int ipOctet = Integer.parseInt(ipParts[i]);
        int subnetOctet = Integer.parseInt(subnetParts[i]);

        networkParts[i] = ipOctet & subnetOctet;

        System.out.print(toBinary(networkParts[i]));
        if (i < 3) System.out.print(".");
    }

    System.out.println("\n");
    System.out.println("Network address (decimal): " +
            networkParts[0] + "." +
            networkParts[1] + "." +
            networkParts[2] + "." +
            networkParts[3]);

    System.out.println("Network range: 192.168.1.96 - 192.168.1.127");
}

// Helper method to convert decimal to 8-bit binary
private static String toBinary(int value) {
    return String.format("%8s", Integer.toBinaryString(value))
            .replace(' ', '0');
}
```

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