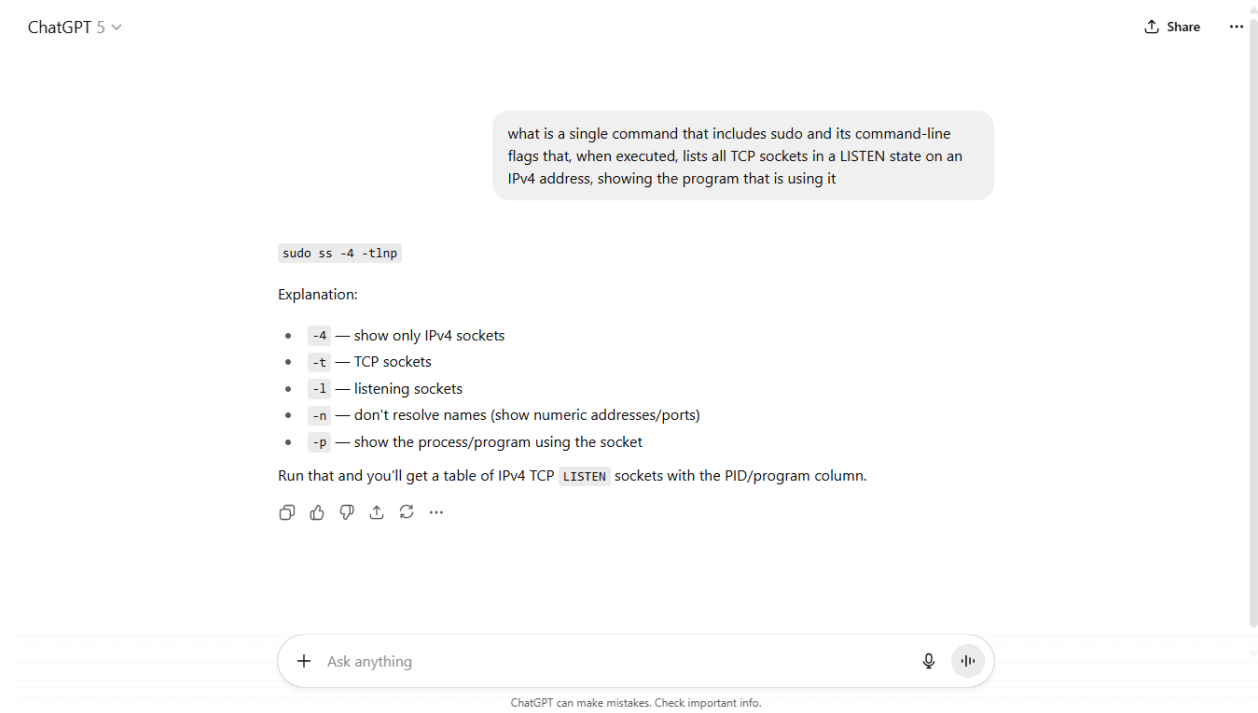


- Take a screenshot of the prompt and the command that ChatGPT generates



- Run the command using `sudo` and take a screenshot of the output to include in your lab notebook.

```
Last login: Tue Oct 7 04:58:30 2025 from 35.230.39.87
emmanart@course-vm:~$ sudo ss -4 -tlnp
```

| State | Recv-Q | Send-Q | Local Address:Port | Peer Address:Port | Process |
|--------|--------|--------|--------------------|-------------------|--|
| LISTEN | 0 | 4096 | 127.0.0.1:53 | 0.0.0.0:* | users: ("systemd-resolve",pid=392,fd=14) |
| LISTEN | 0 | 128 | 0.0.0.0:22 | 0.0.0.0:* | users: ("sshd",pid=697,fd=3) |

```
emmanart@course-vm:~$
```

- List a service that can be contacted from any interface on the machine. List a service that can only be contacted by local processes:

Answer: according to the screen shot the service than can be contacted from any interface on the machine is sshd and the service that can only be contacted by local processes is cupsd.

- List the services that this machine provides for external access:

Answer: From the screenshot it provides sshd on port 0.0.0.0:22 as an external service and as a local/loopback only service it provides these services:

| Service | IP Address/Port |
|--|------------------|
| systemd-resolved | 127.0.0.53%lo:53 |
| Local agent/management socket | 127.0.0.1:43129 |
| Local service socket (packagekitd, fwupd, etc) | 127.0.0.1:38301 |
| Local service socket | 127.0.0.1:38471 |
| Internal system agent (range 6100–6108) | 127.0.0.1:6108 |
| Internal system agent (range 6100–6108) | 127.0.0.1:6106 |
| Internal system agent (range 6100–6108) | 127.0.0.1:6107 |
| Internal system agent (range 6100–6108) | 127.0.0.1:6104 |
| Internal system agent (range 6100–6108) | 127.0.0.1:6105 |
| Internal system agent (range 6100–6108) | 127.0.0.1:6103 |
| Internal system agent (range 6100–6108) | 127.0.0.1:6100 |
| Internal system agent (range 6100–6108) | 127.0.0.1:6101 |
| postfix or sendmail | 127.0.0.1:25 |
| systemd-resolved | 127.0.0.54:53 |
| cupsd | 127.0.0.1:631 |
| Local service socket | 127.0.0.1:35163 |

- Take a screenshot of the prompt and the command that ChatGPT generates

give me the "lsof" command and its command-line flags that, when executed, lists all TCP sockets in a LISTEN state on an IPv4 address, showing the program that is using it.

The command you're looking for is:

```
bash
sudo lsof -i4TCP -sTCP:LISTEN -n -P
```

[Copy code](#)

Explanation of each flag:

- `sudo` — run with elevated privileges to see all processes' sockets
- `-i4TCP` — show only **IPv4 TCP** network files
- `-sTCP:LISTEN` — restrict output to **LISTEN**-state TCP sockets
- `-n` — do **not** resolve hostnames (faster, shows numeric IPs)
- `-P` — do **not** resolve port names (shows numeric port numbers)

✅ **Result:** lists all IPv4 TCP sockets currently in a LISTEN state, along with the **program name**, **PID**, **user**, **file descriptor**, and **port** each is using.

📄 👍 🗨️ 🔗 ↻ ...

+ Ask anything



ChatGPT can make mistakes. Check important info.

- Run the command using `sudo` and take a screenshot of the output to include in your lab notebook.

```
emmanart@course-vm:~$ sudo lsof -i4TCP -sTCP:LISTEN -n -P
COMMAND  PID      USER      FD  TYPE  DEVICE  SIZE/OFF  NODE  NAME
systemd-r 392  systemd-resolve 14u  IPv4    2983        0t0  TCP 127.0.0.53:53 (LISTEN)
sshd      697      root       3u   IPv4    5859        0t0  TCP *:22 (LISTEN)
```

- Show a screenshot of the measured bandwidth available between your `us-west1-b` VM and each of the other Compute Engine VMs. Explain the relative differences (or lack thereof) in your results.

```

emmanart@vm-us-west1-b:~$ iperf -c 10.132.0.2 -p 80
-----
Client connecting to 10.132.0.2, TCP port 80
TCP window size: 85.0 KByte (default)
-----
[  1] local 10.138.0.3 port 42446 connected with 10.132.0.2 port 80
[ ID] Interval           Transfer     Bandwidth
[  1] 0.0000-10.1410 sec   186 MBytes  154 Mbits/sec

```

```

emmanart@vm-us-west1-b:~$ iperf -c 10.142.0.2 -p 80
-----
Client connecting to 10.142.0.2, TCP port 80
TCP window size: 85.0 KByte (default)
-----
[  1] local 10.138.0.3 port 53828 connected with 10.142.0.2 port 80
[ ID] Interval           Transfer     Bandwidth
[  1] 0.0000-10.1042 sec   403 MBytes  335 Mbits/sec

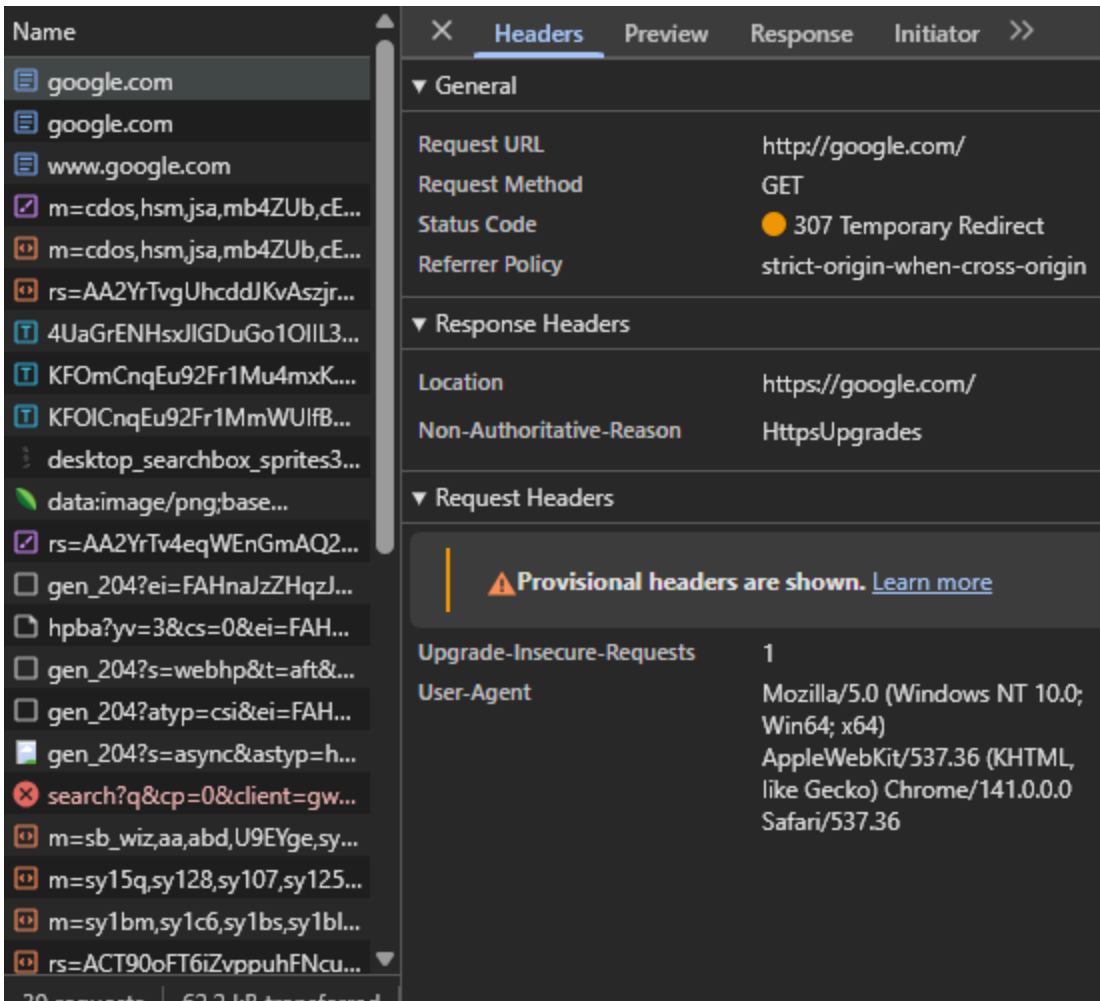
```

```

Last login: Wed Oct  8 22:57:11 2020 from 57.167.152.210
emmanart@vm-us-west1-b:~$ iperf -c 10.152.0.2 -p 80
-----
Client connecting to 10.152.0.2, TCP port 80
TCP window size: 85.0 KByte (default)
-----
[  1] local 10.138.0.3 port 35948 connected with 10.152.0.2 port 80
[ ID] Interval           Transfer     Bandwidth
[  1] 0.0000-10.2170 sec   190 MBytes  156 Mbits/sec
emmanart@vm-us-west1-b:~$ 

```

- Take a screenshot of the initial requests for your lab notebook.



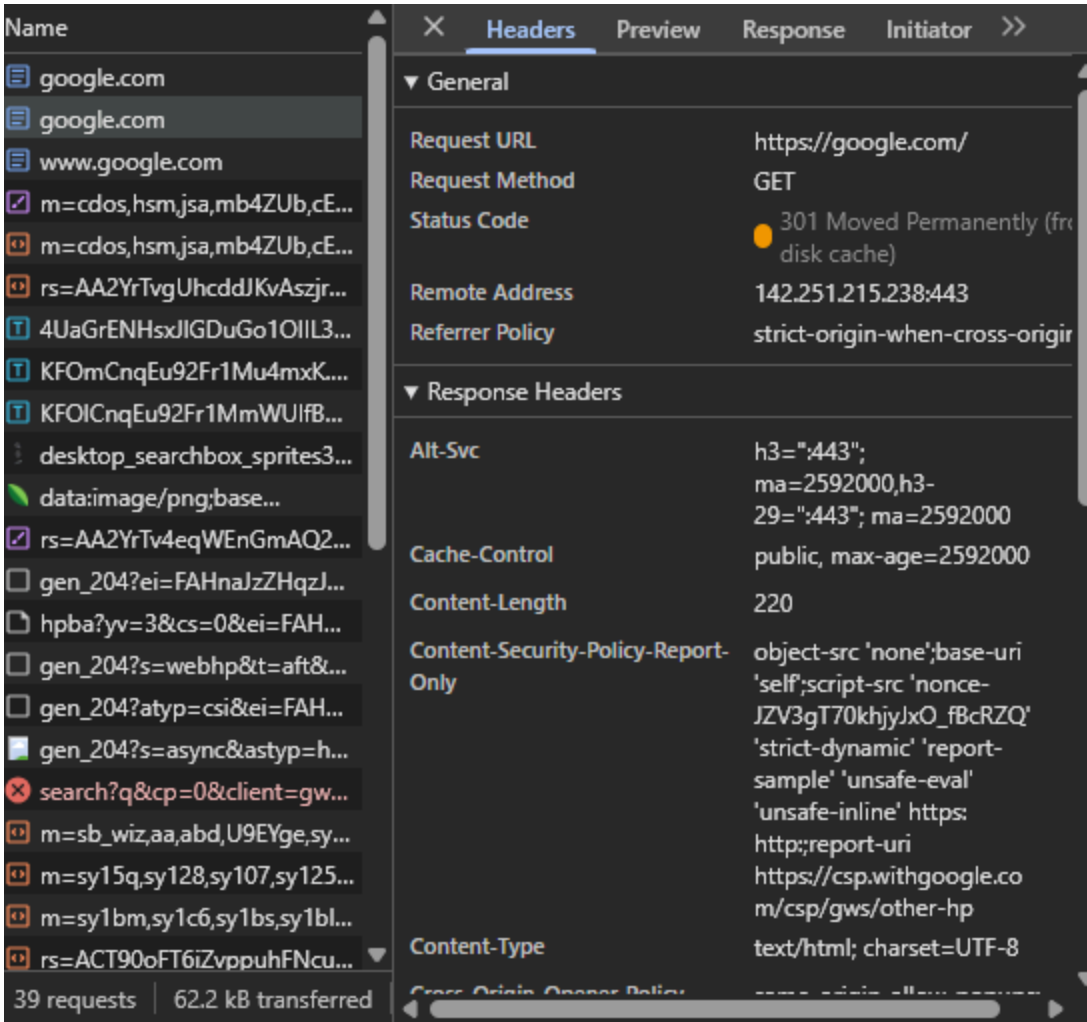
- What is the URL being requested?

http://google.com

- Explain the HTTP status code that is returned and what the code indicates

The status code is 307 which is a temporary redirect

- Take a screenshot indicating the version of the HTTP protocol that is used for each request. (Hint: look at the response status line and **alt-svc**; HTTP response headers indicating HTTP/2 or HTTP/3).



- Show the URLs the browser is redirected to via this header:

The only URL the browser is being redirected to is <https://google.com/>

- Take a screenshot of when cookies are set via [Set-Cookie:](#)

| Name | X | Headers | Preview | Response | Initiator | Timing | >> |
|---------------------------|------------|---------|---------|---|-----------|--------|----|
| google.com | Server | | | gws | | | |
| google.com | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=www.google.com | | | |
| www.google.com | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.www.google.com | | | |
| m=c dos,hsm,jsa,m... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| rs=AA2YrTvgUhcd... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=google.com | | | |
| 4UaGrENHsxJIGDu... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| KFOICnqEu92Fr1... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| desktop_searchbo... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| data:image/png;b... | Set-Cookie | | | SIDCC=AKEyXzWDeRo5WyJ-Hq7qBdORkOrRCYjw1aTe141dnusrQCbrAo27GvBPuzMfKNdMilWJ7SIGyGA; expires=Fri, 09-Oct-2026 00:24:19 GMT; path=/; domain=.google.com; priority=high | | | |
| rs=AA2YrTv4eqWE... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| AF2bZyjIMUOb_... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| KFOmCnqEu92Fr1... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| hpba?yv=3&cs=0... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| ABJXsYp22hSQCl... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| gen_204?s=webh... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| gen_204?atyp=csi... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| search?q&cp=0&... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| m=sb_wiz,aa,abd,... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| m=sy120,sy11y,sy... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| m=sy17c,sy17d,ep... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| rs=ACT90oFI5Neh... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| client_204?atyp=i... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| m=Gnlh6e sv1d4... | Set-Cookie | | | OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com | | | |
| 89 requests 254 kB tran | | | | | | | |

- Take a screenshot of when cookies are attached via [Cookie:](#)

| Name | Headers | Preview | Response | Initiator | Timing | >> |
|---------------------------|-----------------|---------|--|-----------|--------|----|
| google.com | Accept-Language | | en-US,en;q=0.9 | | | |
| google.com | Cookie | | OTZ=8263741_84_88_104280_84_446940; HSID=Apfr4EneSe_OtPerG; SSID=ALZqINqCTw0tlpJwh; APISID=qGU0LTFLn8OdZNM/AnuN PWaRnGHtH32M8; SAPISID=3HR1uZyUSQLM9sq2/AlhKhH146EwS5wubO; __Secure-1PAPISID=3HR1uZyUSQLM9sq2/AlhKhH146EwS5wubO; __Secure-3PAPISID=3HR1uZyUSQLM9sq2/AlhKhH146EwS5wubO; SID=g.a0001wigAkVE0RW5P3JIOOzUyZQAt3WwczhG99D6NFjcFoGYtSA VnFx8jAFrsS04MH8MJJgnQACgYKA RISARcSFQHGx2Mi3UMiVDxdH0oBi8VIHdzdWJRoVAUF8yKpXGDIzOSsDb8C3pqfO42Ib0076; __Secure-1PSID=g.a0001wigAkVE0RW5P3JIOOzUyZQAt3WwczhG99D6NFjcFoGYtSAVDhS6edO4liLqz24iba3ShQACgYKAVgSARcSFQHGx2MiYzUG7liK1ztSzxWojoiYwBoVAUF8yKoy3parZVaCDA9_A_2UyQvi0076; __Secure-3PSID=g.a0001wigAkVE0RW5P3JIOOzUyZQAt3WwczhG99D6NFjcFoGYtSAVJPknWX0cjUCliWtaJxt35wACgYKASYSARcSFQHGx2Miyzu1yQEjYUzLuBH_EtEmBRoVAUF8yKo0onPmrTX9yZJRyCddShzE0076; NID=525=NQGH0V55dLCZA5KPbxNbgxeChAyDLuJ0-DGncHDMZde2AHqisPTP3qBMmkLI | | | |
| www.google.com | | | | | | |
| m=cdo, hsm, jsa, m... | | | | | | |
| m=cdo, hsm, jsa, m... | | | | | | |
| rs=AA2YrTvgUhcd... | | | | | | |
| 4UaGrENHsxJIGDu... | | | | | | |
| KFOICnqEu92Fr1... | | | | | | |
| desktop_searchbo... | | | | | | |
| data:image/png;b... | | | | | | |
| rs=AA2YrTv4eqWE... | | | | | | |
| AF2bZyjIMUhoB... | | | | | | |
| KFOmCnqEu92Fr1... | | | | | | |
| hpba?yv=3&cs=0... | | | | | | |
| ABJXsYp22hSQCl... | | | | | | |
| gen_204?s=webh... | | | | | | |
| gen_204?atyp=csi... | | | | | | |
| search?q&cp=0&... | | | | | | |
| m=sb_wiz,aa,abd... | | | | | | |
| m=sy120,sy11y,sy... | | | | | | |
| m=sy17c,sy17d,ep... | | | | | | |
| rs=ACT90oFI5Neh... | | | | | | |
| client_204?atyp=i... | | | | | | |
| m=Gnlh6e sv1d4... | | | | | | |
| 92 requests 255 kB tran | | | | | | |

- Show the requests and responses in the listing. Click on the last request sent, then click on the response to see that its payload has returned the data that is then rendered on the search page similar to what is shown below for "rabbid"

