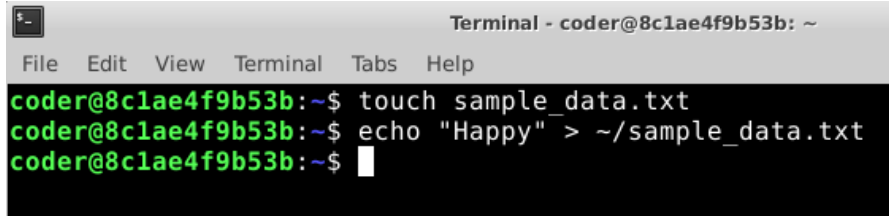


Question 3.

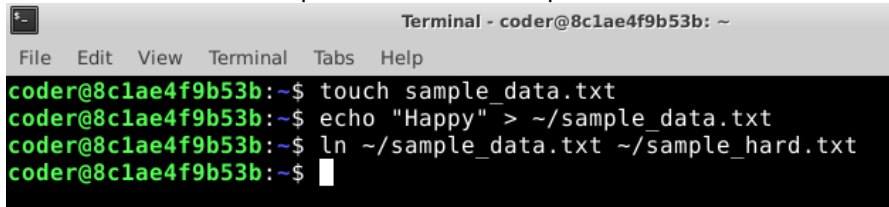
1. Command: `echo "Happy" > ~/sample_data.txt`



```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help
coder@8c1ae4f9b53b:~$ touch sample_data.txt
coder@8c1ae4f9b53b:~$ echo "Happy" > ~/sample_data.txt
coder@8c1ae4f9b53b:~$
```

Explanation: Creates a new file *sample_data.txt* in your home directory and puts one line of text in it. This is our original file for testing links.

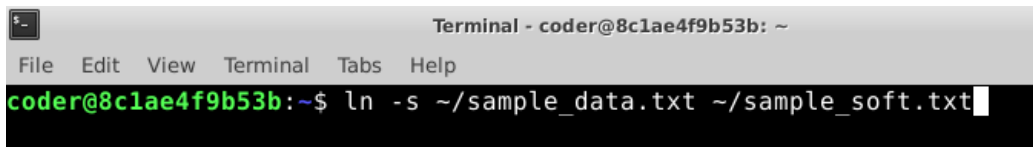
2. Command: `ln ~/sample_data.txt ~/sample_hard.txt`



```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help
coder@8c1ae4f9b53b:~$ touch sample_data.txt
coder@8c1ae4f9b53b:~$ echo "Happy" > ~/sample_data.txt
coder@8c1ae4f9b53b:~$ ln ~/sample_data.txt ~/sample_hard.txt
coder@8c1ae4f9b53b:~$
```

Explanation: Creates a hard link named *sample_hard.txt*. A hard link is a second name for the exact same file data on disk – both names point to the same content.

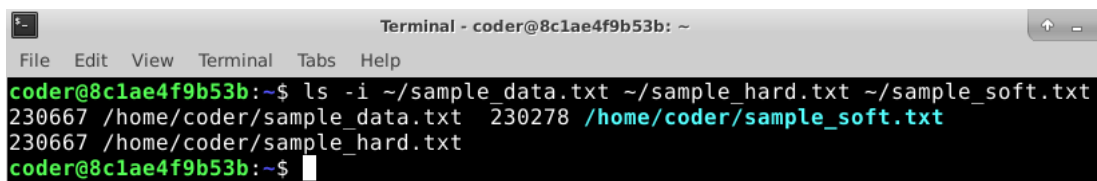
3. Command: `ln -s ~/sample_data.txt ~/sample_soft.txt`



```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help
coder@8c1ae4f9b53b:~$ ln -s ~/sample_data.txt ~/sample_soft.txt
```

Explanation: Creates a symbolic link (soft link) named *sample_soft.txt*. Important: The `-s` flag is required! A symbolic link is just a shortcut that points to the original filename (not the data directly).

4. Command: `ls -li ~/sample_*.txt`



```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help
coder@8c1ae4f9b53b:~$ ls -li ~/sample_data.txt ~/sample_hard.txt ~/sample_soft.txt
230667 /home/coder/sample_data.txt 230278 /home/coder/sample_soft.txt
230667 /home/coder/sample_hard.txt
coder@8c1ae4f9b53b:~$
```

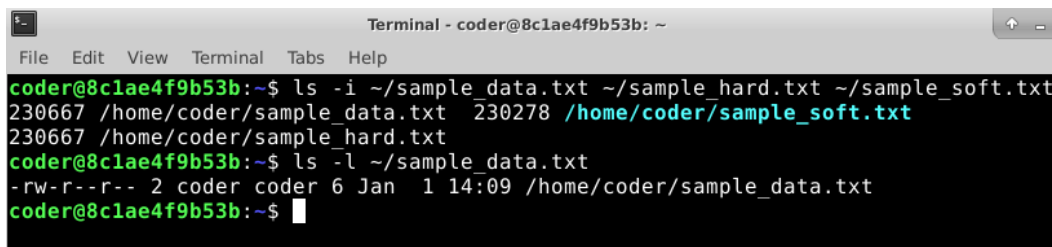
Explanation: *-i* shows the *inode number* of each file. Every file on Linux has a unique inode that stores its data and metadata.

5. Observation: *sample_data.txt* and *sample_hard.txt* share the same inode number. *sample_soft.txt* has a different inode number.

Explanation:

- Hard links are additional names for the *same file data* → same inode.
- Symbolic links are separate small files that contain only the path to the target → different inode.

6. Command: `ls -l ~/sample_data.txt`



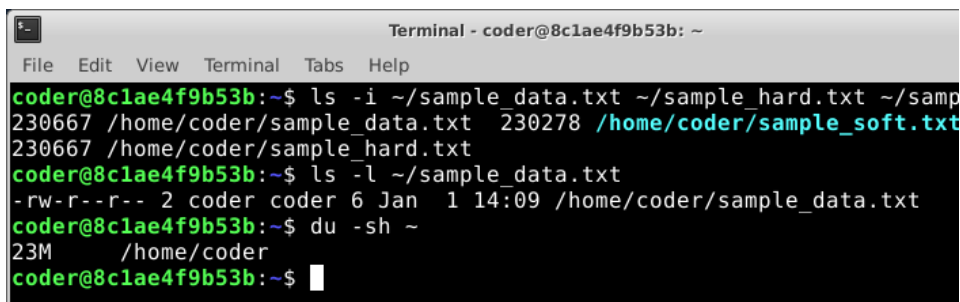
```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help
coder@8c1ae4f9b53b:~$ ls -i ~/sample_data.txt ~/sample_hard.txt ~/sample_soft.txt
230667 /home/coder/sample_data.txt 230278 /home/coder/sample_soft.txt
230667 /home/coder/sample_hard.txt
coder@8c1ae4f9b53b:~$ ls -l ~/sample_data.txt
-rw-r--r-- 2 coder coder 6 Jan  1 14:09 /home/coder/sample_data.txt
coder@8c1ae4f9b53b:~$
```

Explanation:

- Permissions (-rw-rw-r--)
- Link count (2 – because of the hard link)
- Owner and group (coder)
- Size (6 bytes)
- Timestamp

7. Command: `du -sh ~`

Output: 23M /home/coder



```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help
coder@8c1ae4f9b53b:~$ ls -i ~/sample_data.txt ~/sample_hard.txt ~/sample_soft.txt
230667 /home/coder/sample_data.txt 230278 /home/coder/sample_soft.txt
230667 /home/coder/sample_hard.txt
coder@8c1ae4f9b53b:~$ ls -l ~/sample_data.txt
-rw-r--r-- 2 coder coder 6 Jan  1 14:09 /home/coder/sample_data.txt
coder@8c1ae4f9b53b:~$ du -sh ~
23M /home/coder
coder@8c1ae4f9b53b:~$
```

Explanation: `du -sh ~` calculates the total space used by everything in your home directory in human-readable format (K, M, G).

8. Command: `ls -lh ~/.txt`

```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help
coder@8c1ae4f9b53b:~$ ls -i ~/sample_data.txt ~/sample_hard.txt ~/sample_soft.txt
230667 /home/coder/sample_data.txt 230278 /home/coder/sample_soft.txt
230667 /home/coder/sample_hard.txt
coder@8c1ae4f9b53b:~$ ls -l ~/sample_data.txt
-rw-r--r-- 2 coder coder 6 Jan 1 14:09 /home/coder/sample_data.txt
coder@8c1ae4f9b53b:~$ du -sh ~
23M /home/coder
coder@8c1ae4f9b53b:~$ ls -lh ~/.txt
-rw-r--r-- 2 coder coder 6 Jan 1 14:09 /home/coder/sample_data.txt
-rw-r--r-- 2 coder coder 6 Jan 1 14:09 /home/coder/sample_hard.txt
lrwxrwxrwx 1 coder coder 27 Jan 1 14:32 /home/coder/sample_soft.txt -> /home/coder/
sample_data.txt
-rw-r--r-- 1 coder coder 32 Jan 1 13:09 /home/coder/user_info.txt
coder@8c1ae4f9b53b:~$
```

Explanation: `-lh` shows sizes in human-readable form.

- Original and hard link show full size because they share data.
- Symbolic link is tiny – it only stores the path text. Note the `/` and `->` for the symbolic link.

9. Command: `rm ~/sample_soft.txt, ls -l ~/sample_data.txt`

```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help
coder@8c1ae4f9b53b:~$ rm ~/sample_soft.txt
coder@8c1ae4f9b53b:~$ ls -l ~/sample
ls: cannot access '/home/coder/sample': No such file or directory
coder@8c1ae4f9b53b:~$ ls -l ~/sample_data.txt
-rw-r--r-- 2 coder coder 6 Jan 1 14:09 /home/coder/sample_data.txt
coder@8c1ae4f9b53b:~$
```

Explanation: Deleting a symbolic link removes only the shortcut. The original file and hard link remain completely unaffected.

10. Command 1: `du -h --max-depth=1 ~`

```
Terminal - coder@8c1ae4f9b53b: ~
File Edit View Terminal Tabs Help

coder@8c1ae4f9b53b:~$ du -h --max-depth=1 ~
512    /home/coder/Templates
512    /home/coder/workspace
512    /home/coder/Pictures
339K   /home/coder/.mozilla
512    /home/coder/Music
2.0K   /home/coder/.dbus
16K    /home/coder/Desktop
512    /home/coder/Documents
8.5K   /home/coder/.vnc
4.5K   /home/coder/coursera
1.3M   /home/coder/.local
3.0K   /home/coder/project_documents
10K    /home/coder/data
512    /home/coder/Videos
4.0K   /home/coder/.gnupg
512    /home/coder/.eclipse
343K   /home/coder/.config
1.0K   /home/coder/.java
1.8M   /home/coder/.npm
4.0K   /home/coder/Desktop-ro
512    /home/coder/.ssh
```

Explanation: Shows size of each top-level item in your home directory (human-readable, one level deep).

Command 2: df -h ~

```
coder@8c1ae4f9b53b:~$ df -h ~
Filesystem                                Size  Used Avail Use% Mounted on
sed Avail Use% Mounted on
dockerPool/bdb72487931e03bffc5a7ac5f2976d18db784c29f22b59d241d1dda881460bdc 13G 3.7G 9.3G 29% /
coder@8c1ae4f9b53b:~$
```

Explanation: df shows filesystem-level info (not individual folders). -h makes sizes human-readable. This tells you how much total space is used/available on the disk containing your home directory.