Lab 4

Learning goals: Linux OS commands ln, file, cat, more, less, head, tail, history and sort
NOTE: Save screenshots of each exercise, and upload your work to your github account as
Lab4.pdf by end of Thursday Jul 31.
For this lab, download 'Heart.csv' to a folder called 'Lab4'. If the file download to the "Down-
loads" folder by default, move the file to the folder 'Lab4'.

```
ibab@IBAB-Workshop-Comp017:~/Downloads$ mkdir Lab4
ibab@IBAB-Workshop-Comp017:~/Downloads$ mv Heart.csv Lab4
ibab@IBAB-Workshop-Comp017:~/Downloads$ cd Lab4
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ ls
Heart.csv
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```

(1) Create symbolic and hard links to the data file you downloaded. What happens if you
use the same name for the links? Print the screenshot of the output message and paste
it in your answers. Also how do you prove that you have created the links correctly?
Use the appropriate command to prove it.

Soft link created for data file = *heart_link*

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ ln -s Heart.csv heart_link
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ ls
Heart.csv  heart_link
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```
.

Hard link for data file = *heart_hard_link*

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ ln Heart.csv heart_hard_lin
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ ls
Heart.csv  heart_hard_link  heart_link
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```

For creating hard link and symbolic link with the same name as the data file i.e. *Heart.csv* it shows
error

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ ln -s Heart.csv Heart.csv
ln: failed to create symbolic link 'Heart.csv': File exists
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ ln Heart.csv Heart.csv
ln: failed to create hard link 'Heart.csv': File exists
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```
.

To prove that Symbolic Link and Hard Link has been created successfully
ls -li command was used to see that symbolic link is linked to the data file **Heart.csv**

In here we can see that the *i node* number of **Hard link** is the same as the data file and in copy numbers we can see that there are 2 copies of the data file. And for **Symbolic link** we can see that the symbolic link has been linked to the data file.

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ ls -li
total 40
54028038 -rw-rw-r-- 2 ibab ibab 19925 Jul 31 14:03 Heart.csv
54028038 -rw-rw-r-- 2 ibab ibab 19925 Jul 31 14:03 Heart_hard_link
54028204 lrwxrwxrwx 1 ibab ibab     9 Jul 31 14:37 Heart_soft -> Heart.csv
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```

(2) What command will you use to determine the filetype of the downloaded data file? Execute this command and take a screenshot of the command and the output to paste it in your work.

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ file Heart.csv
Heart.csv: CSV text
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```

.
(3) View the contents of the data file using more and less commands. How many pages are there?
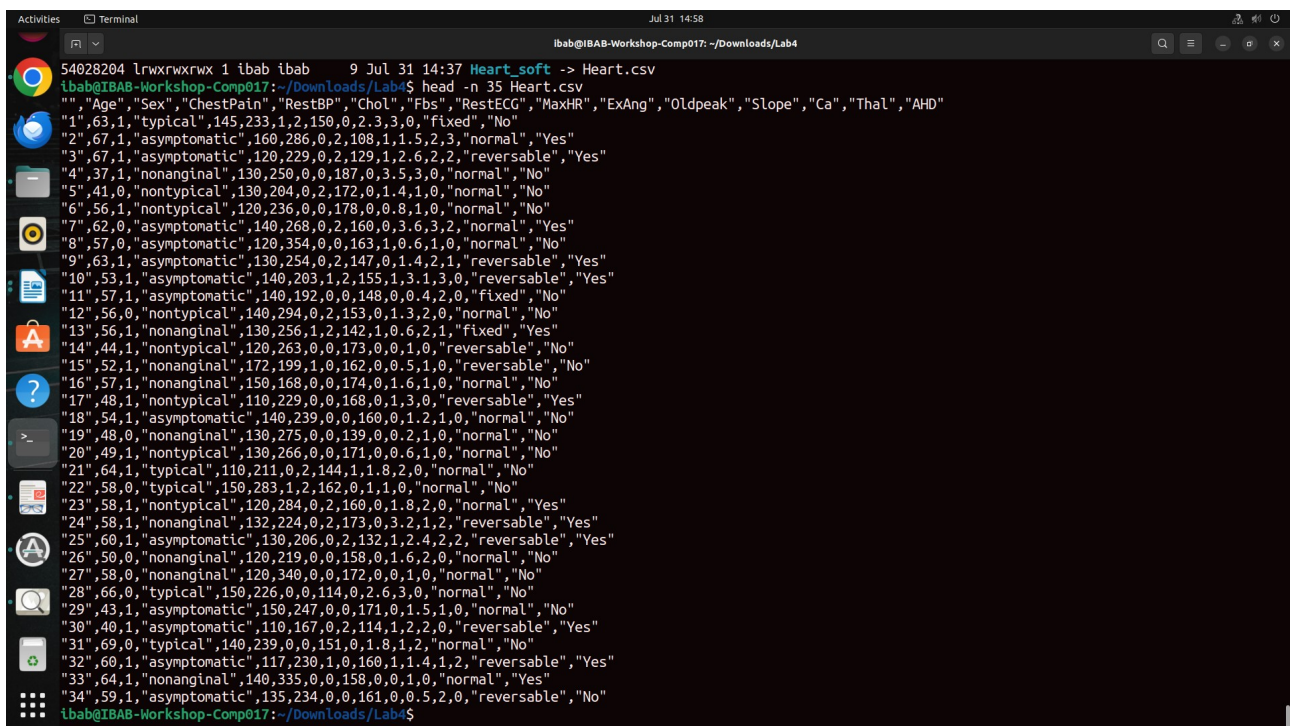Using More Command the output was

```
"279",57,1,"nontypical",154,232,0,2,164,0,0,1,1,"normal","Yes"
"280",58,0,"asymptomatic",130,197,0,0,131,0,0.6,2,0,"normal","No"
"281",57,1,"asymptomatic",110,335,0,0,143,1,3,2,1,"reversable","Yes"
"282",47,1,"nonanginal",130,253,0,0,179,0,0,1,0,"normal","No"
"283",55,0,"asymptomatic",128,205,0,1,130,1,2,2,1,"reversable","Yes"
"284",35,1,"nontypical",122,192,0,0,174,0,0,1,0,"normal","No"
"285",61,1,"asymptomatic",148,203,0,0,161,0,0,1,1,"reversable","Yes"
"286",58,1,"asymptomatic",114,318,0,1,140,0,4.4,3,3,"fixed","Yes"
"287",58,0,"asymptomatic",170,225,1,2,146,1,2.8,2,2,"fixed","Yes"
"288",58,1,"nontypical",125,220,0,0,144,0,0.4,2,NA,"reversable","No"
"289",56,1,"nontypical",130,221,0,2,163,0,0,1,0,"reversable","No"
"290",56,1,"nontypical",120,240,0,0,169,0,0,3,0,"normal","No"
"291",67,1,"nonanginal",152,212,0,2,150,0,0.8,2,0,"reversable","Yes"
"292",55,0,"nontypical",132,342,0,0,166,0,1.2,1,0,"normal","No"
"293",44,1,"asymptomatic",120,169,0,0,144,1,2.8,3,0,"fixed","Yes"
"294",63,1,"asymptomatic",140,187,0,2,144,1,4,1,2,"reversable","Yes"
"295",63,0,"asymptomatic",124,197,0,0,136,1,0,2,0,"normal","Yes"
"296",41,1,"nontypical",120,157,0,0,182,0,0,1,0,"normal","No"
"297",59,1,"asymptomatic",164,176,1,2,90,0,1,2,2,"fixed","Yes"
"298",57,0,"asymptomatic",140,241,0,0,123,1,0.2,2,0,"reversable","Yes"
"299",45,1,"typical",110,264,0,0,132,0,1.2,2,0,"reversable","Yes"
"300",68,1,"asymptomatic",144,193,1,0,141,0,3.4,2,2,"reversable","Yes"
"301",57,1,"asymptomatic",130,131,0,0,115,1,1.2,2,1,"reversable","Yes"
"302",57,0,"nontypical",130,236,0,2,174,0,0,2,1,"normal","Yes"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```

.

Using less commmand the output was

```
"","Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Slope","C
"1",63,1,"typical",145,233,1,2,150,0,2.3,3,0,"fixed","No"
"2",67,1,"asymptomatic",160,286,0,2,108,1,1.5,2,3,"normal","Yes"
"3",67,1,"asymptomatic",120,229,0,2,129,1,2.6,2,2,"reversable","Yes"
"4",37,1,"nonanginal",130,250,0,0,187,0,3.5,3,0,"normal","No"
"5",41,0,"nontypical",130,204,0,2,172,0,1.4,1,0,"normal","No"
"6",56,1,"nontypical",120,236,0,0,178,0,0.8,1,0,"normal","No"
"7",62,0,"asymptomatic",140,268,0,2,160,0,3.6,3,2,"normal","Yes"
"8",57,0,"asymptomatic",120,354,0,0,163,1,0.6,1,0,"normal","No"
"9",63,1,"asymptomatic",130,254,0,2,147,0,1.4,2,1,"reversable","Yes"
"10",53,1,"asymptomatic",140,203,1,2,155,1,3.1,3,0,"reversable","Yes"
"11",57,1,"asymptomatic",140,192,0,0,148,0,0.4,2,0,"fixed","No"
"12",56,0,"nontypical",140,294,0,2,153,0,1.3,2,0,"normal","No"
"13",56,1,"nonanginal",130,256,1,2,142,1,0.6,2,1,"fixed","Yes"
"14",44,1,"nontypical",120,263,0,0,173,0,0,1,0,"reversable","No"
"15",52,1,"nonanginal",172,199,1,0,162,0,0.5,1,0,"reversable","No"
"16",57,1,"nonanginal",150,168,0,0,174,0,1.6,1,0,"normal","No"
"17",48,1,"nontypical",110,229,0,0,168,0,1,3,0,"reversable","Yes"
"18",54,1,"asymptomatic",140,239,0,0,160,0,1.2,1,0,"normal","No"
"19",48,0,"nonanginal",130,275,0,0,139,0,0.2,1,0,"normal","No"
"20",49,1,"nontypical",130,266,0,0,171,0,0.6,1,0,"normal","No"
"21",64,1,"typical",110,211,0,2,144,1,1.8,2,0,"normal","No"
"22",58,0,"typical",150,283,1,2,162,0,1,1,0,"normal","No"
"23",58,1,"nontypical",120,284,0,2,160,0,1.8,2,0,"normal","Yes"
"24",58,1,"nonanginal",132,224,0,2,173,0,3.2,1,2,"reversable","Yes"
"25",60,1,"asymptomatic",130,206,0,2,132,1,2.4,2,2,"reversable","Yes"
"26",50,0,"nonanginal",120,219,0,0,158,0,1.6,2,0,"normal","No"
"27",58,0,"nonanginal",120,340,0,0,172,0,0,1,0,"normal","No"
"28",66,0,"typical",150,226,0,0,114,0,2.6,3,0,"normal","No"
"29",43,1,"asymptomatic",150,247,0,0,171,0,1.5,1,0,"normal","No"
"30",40,1,"asymptomatic",110,167,0,2,114,1,2,2,0,"reversable","Yes"
"31",69,0,"typical",140,239,0,0,151,0,1.8,1,2,"normal","No"
"32",60,1,"asymptomatic",117,230,1,0,160,1,1.4,1,2,"reversable","Yes"
"33",64,1,"nonanginal",140,335,0,0,158,0,0,1,0,"normal","Yes"
"34",59,1,"asymptomatic",135,234,0,0,161,0,0.5,2,0,"reversable","No"
"35",44,1,"nonanginal",130,233,0,0,179,1,0.4,1,0,"normal","No"
"36",42,1,"asymptomatic",140,226,0,0,178,0,0,1,0,"normal","No"
Heart.csv
```

So, there are total *9 pages* in the data file.

(4) Output the first 35 lines of the data file using the appropriate command. Save the screenshot in your work.

(5) Output the last 15 lines of the data file using the appropriate command. Save the screenshot in your work.

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ tail -n 15 Heart.csv
"289",56,1,"nontypical",130,221,0,2,163,0,0,1,0,"reversable","No"
"290",56,1,"nontypical",120,240,0,0,169,0,0,3,0,"normal","No"
"291",67,1,"nonanginal",152,212,0,2,150,0,0.8,2,0,"reversable","Yes"
"292",55,0,"nontypical",132,342,0,0,166,0,1.2,1,0,"normal","No"
"293",44,1,"asymptomatic",120,169,0,0,144,1,2.8,3,0,"fixed","Yes"
"294",63,1,"asymptomatic",140,187,0,2,144,1,4,1,2,"reversable","Yes"
"295",63,0,"asymptomatic",124,197,0,0,136,1,0,2,0,"normal","Yes"
"296",41,1,"nontypical",120,157,0,0,182,0,0,1,0,"normal","No"
"297",59,1,"asymptomatic",164,176,1,2,90,0,1,2,2,"fixed","Yes"
"298",57,0,"asymptomatic",140,241,0,0,123,1,0.2,2,0,"reversable","Yes"
"299",45,1,"typical",110,264,0,0,132,0,1.2,2,0,"reversable","Yes"
"300",68,1,"asymptomatic",144,193,1,0,141,0,3.4,2,2,"reversable","Yes"
"301",57,1,"asymptomatic",130,131,0,0,115,1,1.2,2,1,"reversable","Yes"
"302",57,0,"nontypical",130,236,0,2,174,0,0,2,1,"normal","Yes"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```

.

(6) Use the history command to list the last few commands, and execute the second last command in your list. Do this using both the process ID and the first letter of the command

The command used will be '*!*'.

By using the PID

```
 1025  more Heart.csv
 1026  less Heart.csv
 1027  head -n 35 Heart.csv
 1028  tail -n 15 Heart.csv
 1029  history
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ !1028
tail -n 15 Heart.csv
"289",56,1,"nontypical",130,221,0,2,163,0,0,1,0,"reversable","No"
"290",56,1,"nontypical",120,240,0,0,169,0,0,3,0,"normal","No"
"291",67,1,"nonanginal",152,212,0,2,150,0,0.8,2,0,"reversable","Yes"
"292",55,0,"nontypical",132,342,0,0,166,0,1.2,1,0,"normal","No"
"293",44,1,"asymptomatic",120,169,0,0,144,1,2.8,3,0,"fixed","Yes"
"294",63,1,"asymptomatic",140,187,0,2,144,1,4,1,2,"reversable","Yes"
"295",63,0,"asymptomatic",124,197,0,0,136,1,0,2,0,"normal","Yes"
"296",41,1,"nontypical",120,157,0,0,182,0,0,1,0,"normal","No"
"297",59,1,"asymptomatic",164,176,1,2,90,0,1,2,2,"fixed","Yes"
"298",57,0,"asymptomatic",140,241,0,0,123,1,0.2,2,0,"reversable","Yes"
"299",45,1,"typical",110,264,0,0,132,0,1.2,2,0,"reversable","Yes"
"300",68,1,"asymptomatic",144,193,1,0,141,0,3.4,2,2,"reversable","Yes"
"301",57,1,"asymptomatic",130,131,0,0,115,1,1.2,2,1,"reversable","Yes"
"302",57,0,"nontypical",130,236,0,2,174,0,0,2,1,"normal","Yes"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
```

.

By using the first letter of the command

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ !t
tail -n 15 Heart.csv
"289",56,1,"nontypical",130,221,0,2,163,0,0,1,0,"reversable","No"
"290",56,1,"nontypical",120,240,0,0,169,0,0,3,0,"normal","No"
"291",67,1,"nonanginal",152,212,0,2,150,0,0.8,2,0,"reversable","Yes"
"292",55,0,"nontypical",132,342,0,0,166,0,1.2,1,0,"normal","No"
"293",44,1,"asymptomatic",120,169,0,0,144,1,2.8,3,0,"fixed","Yes"
"294",63,1,"asymptomatic",140,187,0,2,144,1,4,1,2,"reversable","Yes"
"295",63,0,"asymptomatic",124,197,0,0,136,1,0,2,0,"normal","Yes"
"296",41,1,"nontypical",120,157,0,0,182,0,0,1,0,"normal","No"
"297",59,1,"asymptomatic",164,176,1,2,90,0,1,2,2,"fixed","Yes"
"298",57,0,"asymptomatic",140,241,0,0,123,1,0.2,2,0,"reversable","Yes"
"299",45,1,"typical",110,264,0,0,132,0,1.2,2,0,"reversable","Yes"
"300",68,1,"asymptomatic",144,193,1,0,141,0,3.4,2,2,"reversable","Yes"
"301",57,1,"asymptomatic",130,131,0,0,115,1,1.2,2,1,"reversable","Yes"
"302",57,0,"nontypical",130,236,0,2,174,0,0,2,1,"normal","Yes"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$
```

.

(7) The sort command. For each of the exercises below, find the correct combination of options for the sort command using the man pages. Make sure to show your sequence of steps clearly in your submission work.

(i) Sort the data according to the first column, keeping in mind that the first column has numbers. Save the output in a new file called col1_sorted.out.

```
ibab@IBAB-Workshop-Comp017:~/Downloads$ sort -n Heart.csv -o col1_sorted.out
ibab@IBAB-Workshop-Comp017:~/Downloads$ cat col1_sorted.out
0,"Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Slope","Ca","Th
1,63,1,"typical",145,233,1,2,150,0,2.3,3,0,"fixed","No"
2,67,1,"asymptomatic",160,286,0,2,108,1,1.5,2,3,"normal","Yes"
3,67,1,"asymptomatic",120,229,0,2,129,1,2.6,2,2,"reversable","Yes"
4,37,1,"nonanginal",130,250,0,0,187,0,3.5,3,0,"normal","No"
5,41,0,"nontypical",130,204,0,2,172,0,1.4,1,0,"normal","No"
6,56,1,"nontypical",120,236,0,0,178,0,0.8,1,0,"normal","No"
7,62,0,"asymptomatic",140,268,0,2,160,0,3.6,3,2,"normal","Yes"
8,57,0,"asymptomatic",120,354,0,0,163,1,0.6,1,0,"normal","No"
9,63,1,"asymptomatic",130,254,0,2,147,0,1.4,2,1,"reversable","Yes"
10,53,1,"asymptomatic",140,203,1,2,155,1,3.1,3,0,"reversable","Yes"
11,57,1,"asymptomatic",140,192,0,0,148,0,0.4,2,0,"fixed","No"
12,56,0,"nontypical",140,294,0,2,153,0,1.3,2,0,"normal","No"
13,56,1,"nonanginal",130,256,1,2,142,1,0.6,2,1,"fixed","Yes"
14,44,1,"nontypical",120,263,0,0,173,0,0,1,0,"reversable","No"
```

(ii) Sort the data according to the 'Age' column. Save the output in a new file called age_sorted.out.

```
"","Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Slope"
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort -t ',' -k 2 Heart.csv -o age_sorted.out
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ cat age_sorted.out
"133",29,1,"nontypical",130,204,0,2,202,0,0,1,0,"normal","No"
"226",34,0,"nontypical",118,210,0,0,192,0,0.7,1,0,"normal","No"
"102",34,1,"typical",118,182,0,2,174,0,0,1,0,"normal","No"
"118",35,0,"asymptomatic",138,183,0,0,182,0,1.4,1,0,"normal","No"
"139",35,1,"asymptomatic",120,198,0,0,130,1,1.6,2,0,"reversable","Yes"
"169",35,1,"asymptomatic",126,282,0,2,156,1,0,1,0,"reversable","Yes"
"284",35,1,"nontypical",122,192,0,0,174,0,0,1,0,"normal","No"
"211",37,0,"nonanginal",120,215,0,0,170,0,0,1,0,"normal","No"
"4",37,1,"nonanginal",130,250,0,0,187,0,3.5,3,0,"normal","No"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
"212",38,1,"typical",120,231,0,0,182,1,3.8,2,0,"reversable","Yes"
```

(iii) Sort the data in a reverse manner according to the 'RestBP' column. Save the output in a new file called restbp_revsort.out.

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort -t ',' -k 5 -nr Heart.csv -o restbp_revsort.out
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ cat restbp_revsort.out
"127",56,0,"asymptomatic",200,288,1,2,133,1,4,3,2,"reversable","Yes"
"189",54,1,"nontypical",192,283,0,2,195,0,0,1,1,"reversable","Yes"
"202",64,0,"asymptomatic",180,325,0,0,154,1,0,1,0,"normal","No"
"214",66,0,"asymptomatic",178,228,1,0,165,1,1,2,2,"reversable","Yes"
"173",59,0,"asymptomatic",174,249,0,0,143,1,0,2,0,"normal","Yes"
"147",57,1,"asymptomatic",165,289,1,2,124,0,1,2,3,"reversable","Yes"
"200",59,1,"typical",160,273,0,2,125,0,0,1,0,"normal","Yes"
"188",66,1,"nontypical",160,246,0,0,120,1,0,2,3,"fixed","Yes"
"235",54,0,"nonanginal",160,201,0,0,163,0,0,1,1,"normal","No"
"185",60,0,"asymptomatic",158,305,0,2,161,0,0,1,0,"normal","Yes"
"259",70,1,"nontypical",156,245,0,2,143,0,0,1,0,"normal","No"
"279",57,1,"nontypical",154,232,0,2,164,0,0,1,1,"normal","Yes"
"228",67,0,"nonanginal",152,277,0,0,172,0,0,1,1,"normal","No"
"269",40,1,"asymptomatic",152,223,0,0,181,0,0,1,0,"reversable","Yes"
"122",63,0,"asymptomatic",150,407,0,2,154,0,4,2,3,"reversable","Yes"
```

(iv) Repeat (ii) and (iii) by giving GNU-style parameters to the sort command. This is where man pages are extremely useful!

    (ii) by GNU-style Parameters to sort

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort --field-separator=, --key=2 --numeric-sort Heart.csv --output=age_sorted.out
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ cat age_sorted.out
"","Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Slope","Ca","Thal","AHD"
"133",29,1,"nontypical",130,204,0,2,202,0,0,1,0,"normal","No"
"226",34,0,"nontypical",118,210,0,0,192,0,0.7,1,0,"normal","No"
"102",34,1,"typical",118,182,0,2,174,0,0,1,0,"normal","No"
"118",35,0,"asymptomatic",138,183,0,0,182,0,1.4,1,0,"normal","No"
"139",35,1,"asymptomatic",120,198,0,0,130,1,1.6,2,0,"reversable","Yes"
"169",35,1,"asymptomatic",126,282,0,2,156,1,0,1,0,"reversable","Yes"
"284",35,1,"nontypical",122,192,0,0,174,0,0,1,0,"normal","No"
"211",37,0,"nonanginal",120,215,0,0,170,0,0,1,0,"normal","No"
"4",37,1,"nonanginal",130,250,0,0,187,0,3.5,3,0,"normal","No"
"212",38,1,"typical",120,231,0,0,182,1,3.8,2,0,"reversable","Yes"
```

(iii) by GNU-style parameters to sort

```
125 ,31,1, nonangthat ,100,222,0,0,145,1,1.2,2,0, normal , No
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort --field-separator=, --key=5 --numeric-sort --reverse
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ cat restbp_revsort.out
"127",56,0,"asymptomatic",200,288,1,2,133,1,4,3,2,"reversable","Yes"
"189",54,1,"nontypical",192,283,0,2,195,0,0,1,1,"reversable","Yes"
"202",64,0,"asymptomatic",180,325,0,0,154,1,0,1,0,"normal","No"
"214",66,0,"asymptomatic",178,228,1,0,165,1,1,2,2,"reversable","Yes"
"173",59,0,"asymptomatic",174,249,0,0,143,1,0,2,0,"normal","Yes"
"147",57,1,"asymptomatic",165,289,1,2,124,0,1,2,3,"reversable","Yes"
"200",59,1,"typical",160,273,0,2,125,0,0,1,0,"normal","Yes"
"188",66,1,"nontypical",160,246,0,0,120,1,0,2,3,"fixed","Yes"
"235",54,0,"nonanginal",160,201,0,0,163,0,0,1,1,"normal","No"
"185",60,0,"asymptomatic",158,305,0,2,161,0,0,1,0,"normal","Yes"
"259",70,1,"nontypical",156,245,0,2,143,0,0,1,0,"normal","No"
"279",57,1,"nontypical",154,232,0,2,164,0,0,1,1,"normal","Yes"
"228",67,0,"nonanginal",152,277,0,0,172,0,0,1,1,"normal","No"
"269",40,1,"asymptomatic",152,223,0,0,181,0,0,1,0,"reversable","Yes"
"122",63,0,"asymptomatic",150,407,0,2,154,0,4,2,3,"reversable","Yes"
"22",58,0,"typical",150,283,1,2,162,0,1,1,0,"normal","No"
"40",61,1,"nonanginal",150,243,1,0,137,1,1,2,0,"normal","No"
"41",65,0,"asymptomatic",150,225,0,2,114,0,1,2,3,"reversable","Yes"
"285",61,1,"asymptomatic",148,203,0,0,161,0,0,1,1,"reversable","Yes"
"277" CC 0 "                " 116 370 0 3 153 0 0 3 1 "        " "N "
```

(v) Sort the data first according to age, and then according to RestBP. How would
you do this? Explain the steps clearly.

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort -t ',' -k 2  Heart.csv -o age_sorted.out
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort -c age_sorted.out
sort: age_sorted.out:3: disorder: "102",34,1,"typical",118,182,0,2,174,0,0,1,0,"normal","No"
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ cat age_sorted.out
"133",29,1,"nontypical",130,204,0,2,202,0,0,1,0,"normal","No"
"226",34,0,"nontypical",118,210,0,0,192,0,0.7,1,0,"normal","No"
"102",34,1,"typical",118,182,0,2,174,0,0,1,0,"normal","No"
"118",35,0,"asymptomatic",138,183,0,0,182,0,1.4,1,0,"normal","No"
"139",35,1,"asymptomatic",120,198,0,0,130,1,1.6,2,0,"reversable","Yes"
"169",35,1,"asymptomatic",126,282,0,2,156,1,0,1,0,"reversable","Yes"
"284",35,1,"nontypical",122,192,0,0,174,0,0,1,0,"normal","No"
"211",37,0,"nonanginal",120,215,0,0,170,0,0,1,0,"normal","No"
"4",37,1,"nonanginal",130,250,0,0,187,0,3.5,3,0,"normal","No"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
"212",38,1,"typical",120,231,0,0,182,1,3.8,2,0,"reversable","Yes"
"278",39,0,"nonanginal",138,220,0,0,152,0,0,2,0,"normal","No"
"223",39,0,"nonanginal",94,199,0,0,179,0,0,1,0,"normal","No"
"110",39,1,"asymptomatic",118,219,0,0,140,0,1.2,2,0,"reversable","Yes"
"83",39,1,"nonanginal",140,321,0,2,182,0,0,1,0,"normal","No"
"30",40,1,"asymptomatic",110,167,0,2,114,1,2,2,0,"reversable","Yes"
"269",40,1,"asymptomatic",152,223,0,0,181,0,0,1,0,"reversable","Yes"
"42" 40 1 "typical" 140 199 0 0 178 1 1 4 1 0 "reversable" "No"
```

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort -t ',' -k 2 -n -k 5 -n Heart.csv
"","Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Sl
"133",29,1,"nontypical",130,204,0,2,202,0,0,1,0,"normal","No"
"226",34,0,"nontypical",118,210,0,0,192,0,0.7,1,0,"normal","No"
"102",34,1,"typical",118,182,0,2,174,0,0,1,0,"normal","No"
"118",35,0,"asymptomatic",138,183,0,0,182,0,1.4,1,0,"normal","No"
"139",35,1,"asymptomatic",120,198,0,0,130,1,1.6,2,0,"reversable","Yes"
"284",35,1,"nontypical",122,192,0,0,174,0,0,1,0,"normal","No"
"169",35,1,"asymptomatic",126,282,0,2,156,1,0,1,0,"reversable","Yes"
"211",37,0,"nonanginal",120,215,0,0,170,0,0,1,0,"normal","No"
"4",37,1,"nonanginal",130,250,0,0,187,0,3.5,3,0,"normal","No"
"212",38,1,"typical",120,231,0,0,182,1,3.8,2,0,"reversable","Yes"
"303",38,1,"nonanginal",138,175,0,0,173,0,0,1,NA,"normal","No"
"223",39,0,"nonanginal",94,199,0,0,179,0,0,1,0,"normal","No"
"278",39,0,"nonanginal",138,220,0,0,152,0,0,2,0,"normal","No"
"110",39,1,"asymptomatic",118,219,0,0,140,0,1.2,2,0,"reversable","Yes"
"83",39,1,"nonanginal",140,321,0,2,182,0,0,1,0,"normal","No"
"42",40,1,"typical",140,199,0,0,178,1,1.4,1,0,"reversable","No"
"30",40,1,"asymptomatic",110,167,0,2,114,1,2,2,0,"reversable","Yes"
"269",40,1,"asymptomatic",152,223,0,0,181,0,0,1,0,"reversable","Yes"
"5",41,0,"nontypical",130,204,0,2,172,0,1.4,1,0,"normal","No"
"51",41,0,"nontypical",105,198,0,0,168,0,0,1,1,"normal","No"
"221",41,0,"nonanginal",112,268,0,2,172,1,0,1,0,"normal","No"
```

(vi) Sort the data according to sex, then according to age, then according to ChestPain.
Explain the steps clearly.

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort -t ',' -k 3 -n -k 2 -n -k 4 -s Heart.csv -o Sex_Age_ChestPainsort.out
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ cat Sex_Age_ChestPainsort.out
"","Age","Sex","ChestPain","RestBP","Chol","Fbs","RestECG","MaxHR","ExAng","Oldpeak","Slope","Ca","Thal","AHD"
"226",34,0,"nontypical",118,210,0,0,192,0,0.7,1,0,"normal","No"
"118",35,0,"asymptomatic",138,183,0,0,182,0,1.4,1,0,"normal","No"
"211",37,0,"nonanginal",120,215,0,0,170,0,0,1,0,"normal","No"
"223",39,0,"nonanginal",94,199,0,0,179,0,0,1,0,"normal","No"
"278",39,0,"nonanginal",138,220,0,0,152,0,0,2,0,"normal","No"
"5",41,0,"nontypical",130,204,0,2,172,0,1.4,1,0,"normal","No"
"51",41,0,"nontypical",105,198,0,0,168,0,0,1,1,"normal","No"
"221",41,0,"nonanginal",112,268,0,2,172,1,0,1,0,"normal","No"
"242",41,0,"nontypical",126,306,0,0,163,0,0,1,0,"normal","No"
"152",42,0,"asymptomatic",102,265,0,2,122,0,0.6,2,0,"normal","No"
"256",42,0,"nonanginal",120,209,0,0,173,0,0,2,0,"normal","No"
"114",43,0,"asymptomatic",132,341,1,2,136,1,3,2,0,"reversable","Yes"
"135",43,0,"nonanginal",122,213,0,0,165,0,0.2,2,0,"normal","No"
"94",44,0,"nonanginal",108,141,0,0,175,0,0.6,2,0,"normal","No"
"261",44,0,"nonanginal",118,242,0,0,149,0,0.3,2,1,"normal","No"
"126",45,0,"nontypical",130,234,0,2,175,0,0.6,2,0,"normal","No"
"170",45,0,"nontypical",112,160,0,0,138,0,0,2,0,"normal","No"
"198",45,0,"asymptomatic",138,236,0,2,152,1,0.2,2,0,"normal","No"
"62",46,0,"nonanginal",142,177,0,2,160,1,1.4,3,0,"normal","No"
"217",46,0,"nontypical",105,204,0,0,172,0,0,1,0,"normal","No"
.
```

Sorting according to chest pain

```
ibab@IBAB-Workshop-Comp017:~/Downloads/Lab4$ sort -t ',' -k 4 Sex_Age_ChestPainsort.out
"247",58,1,"asymptomatic",100,234,0,0,156,0,0.1,1,1,"reversable","Yes"
"164",58,0,"asymptomatic",100,248,0,2,122,0,1,2,0,"normal","No"
"196",67,1,"asymptomatic",100,299,0,2,125,1,0.9,2,2,"normal","Yes"
"152",42,0,"asymptomatic",102,265,0,2,122,0,0.6,2,0,"normal","No"
"81",45,1,"asymptomatic",104,208,0,2,148,1,3,2,0,"normal","No"
"257",67,0,"asymptomatic",106,223,0,0,142,0,0.3,1,2,"normal","No"
"177",52,1,"asymptomatic",108,233,1,0,147,0,0.1,1,3,"reversable","No"
"225",63,0,"asymptomatic",108,269,0,0,169,1,1.8,2,2,"normal","Yes"
"30",40,1,"asymptomatic",110,167,0,2,114,1,2,2,0,"reversable","Yes"
"58",41,1,"asymptomatic",110,172,0,2,158,0,0,1,0,"reversable","Yes"
"75",44,1,"asymptomatic",110,197,0,2,177,0,0,1,1,"normal","Yes"
"251",57,1,"asymptomatic",110,201,0,0,126,1,1.5,2,0,"fixed","No"
"229",54,1,"asymptomatic",110,206,0,2,108,1,0,2,1,"normal","Yes"
"205",43,1,"asymptomatic",110,211,0,0,161,0,0,1,0,"reversable","No"
"128",54,1,"asymptomatic",110,239,0,0,126,1,2.8,2,1,"reversable","Yes"
"97",59,1,"asymptomatic",110,239,0,2,142,1,1.2,2,1,"reversable","Yes"
"74",65,1,"asymptomatic",110,248,0,2,158,0,0.6,1,2,"fixed","Yes"
"201",50,0,"asymptomatic",110,254,0,2,159,0,0,1,0,"normal","No"
"248",47,1,"asymptomatic",110,275,0,2,118,1,1,2,1,"normal","Yes"
"281",57,1,"asymptomatic",110,335,0,0,143,1,3,2,1,"reversable","Yes"
"274",71,0,"asymptomatic",112,149,0,0,125,0,1.6,2,0,"normal","No"
"227",47,1,"asymptomatic",112,204,0,0,143,0,0.1,1,0,"normal","No"
```