CS 101
Spring 2016
Programming Assignment 2

- Write a C++ program project2.cpp that operates as described below.
- Your program should accept three command line arguments. The first two arguments are names of input files, and the third argument is the name of an output file.
- The data in all three files will be stored as comma-separated values (csv files format). You must use C++ streams for all I/O. You cannot use Scanner from cs100.
- You can open csv files with an ordinary text file editor or by using Microsoft Excel. Both views will be illustrated in the examples below.
- The first input file contains a database arranged as a 2-dimensionsal table. The first line (row) contains column headings. Each remaining line or row contains a data record that consists of plain-text fields separated by commas. You may assume that each file contains at most 50000 rows, and that every row contains the same number of fields which is at most 100.
- Example: Here are two views of a first input file input0.csv:

```
First nm,Last nm,Gender,Cwid,Cred hrs,Qual pts,Gpa
John,Roe,M,44444444,40,150,3.75
Jane,Roe,F,66666666,100,260,2.6
John,Doe,M,22222222,50,140,2.8
Jane,Doe,F,88888888,80,280,3.5
Penny,Lowe,F,55555555,40,140,3.5
Lenny,Lowe,M,11111111,100,280,2.8
Denny,Lowe,M,99999999,80,260,3.25
Benny,Lowe,M,77777777,120,90,0.75
Jenny,Lowe,F,33333333,50,90,1.8
Zoe,Coe,F,00000000,50,130,2.6
```

First nm	Last nm	Gender	Cwid	Cred hrs	Qual pts	Gpa
John	Roe	M	44444444	40	150	3.75
Jane	Roe	F	66666666	100	260	2.6
John	Doe	M	22222222	50	140	2.8
Jane	Doe	F	88888888	80	280	3.5
Penny	Lowe	F	55555555	40	140	3.5
Lenny	Lowe	M	11111111	100	280	2.8
Denny	Lowe	M	99999999	80	260	3.25
Benny	Lowe	M	77777777	120	90	0.75
Jenny	Lowe	F	33333333	50	90	1.8
Zoe	Coe	F	0	50	130	2.6

- The second input file specifies how your program should sort the data from the first input file. Each row of the second file has three fields, as follows. The first field is a column name from the first input file, the second field specifies the direction (ascend or descend), and the

third field specifies the data type (string, int, or float). The first row denotes the primary key for sorting, the second row (if it exists) denotes the secondary key, etc.

- Example: Here are two views of a second input file input0-7.csv:

```
Gender,ascend,string
Gpa,descend,float
Last nm,ascend,string
```

Gender	ascend	string
Gpa	descend	float
Last nm	ascend	string

- The output file should contain the same data as the first input file, with the rows rearranged as specified in the second input file. However, the first line of the output file should still contain the column headings.
- Example: Next suppose your C++ program is program2.cpp and we run these commands:
  g++ project2.cpp –o project2
  ./project2 input0.csv input0-7.csv output0-7.csv
  Finally here are two views of the expected output file output0-7.csv:

```
First nm,Last nm,Gender,Cwid,Cred hrs,Qual pts,Gpa
Jane,Doe,F,88888888,80,280,3.5
Penny,Lowe,F,55555555,40,140,3.5
Zoe,Coe,F,00000000,50,130,2.6
Jane,Roe,F,66666666,100,260,2.6
Jenny,Lowe,F,33333333,50,90,1.8
John,Roe,M,44444444,40,150,3.75
Denny,Lowe,M,99999999,80,260,3.25
John,Doe,M,22222222,50,140,2.8
Lenny,Lowe,M,11111111,100,280,2.8
Benny,Lowe,M,77777777,120,90,0.75
```

First nm	Last nm	Gender	Cwid	Cred hrs	Qual pts	Gpa
Jane	Doe	F	88888888	80	280	3.5
Penny	Lowe	F	55555555	40	140	3.5
Zoe	Coe	F	0	50	130	2.6
Jane	Roe	F	66666666	100	260	2.6
Jenny	Lowe	F	33333333	50	90	1.8
John	Roe	M	44444444	40	150	3.75
Denny	Lowe	M	99999999	80	260	3.25
John	Doe	M	22222222	50	140	2.8
Lenny	Lowe	M	11111111	100	280	2.8
Benny	Lowe	M	77777777	120	90	0.75

- Because the exact size of the database is not known in advance, your program should use an efficient sorting algorithm. Otherwise your program might be too slow for some larger data sizes, and if so then points will be deducted.

- Your program must define and use a class that stores the information found in a csv file. This class should contain at least the number of rows, the number of columns, and the data itself.
- Please carefully read the following requirements:
    - You must supply a makefile that supports the commands "make" and "make clean". Also, “make project2” should build your program executable named project2.
    - You may only use these libraries: <iostream>, <fstream>, <string>, <cctype>, <vector>.
    - Your input and output files must be in csv file format as in the examples above.
    - You must do your own work, you must not share code.
    - You must submit your project in a zipfile named LASTNAME_FIRSTNAME.zip that contains your makefile and all your source files such as .cpp and .h files that are needed to build the executable.
    - As for previous project in this course, if you unzip your zipfile you should get only the contents of the directory and not the directory itself.
    - You must submit the project on Blackboard by the due date. Late submissions will incur a 10% deduction per day late. No submissions will be accepted after 3 days late.