

Name: _____

Problem	Points	Score
1	50	
2	50	
Total	100	

Notes:

- (1) For this exam you are allowed to open a terminal window on your computer, you are allowed to web surf with Google, but you cannot use online chat or other interactive services.

Problem No. 1: Write a program to sort a data structure using `bsearch`. Create a text file that has the following data in it:

```
ECE_1111  11 -1.000
ECE_2222  22 10.000
ECE_3333  33  5.000
```

Read each line of the file into a structure that consists of a character string, an integer value and a 32-bit float (type `float`). Your code should work for any size file.

Use the Unix `bsearch` library (**BIG HINT: type “`man bsearch`” from the command line and read the entire man page**) to sort this data based on the numerical value of the third value in the line – in descending order (largest value first). Print out the sorted data. For the above example, your output should be:

```
ECE_2222  22 10.000
ECE_3333  33  5.000
ECE_1111  11 -1.000
```

Your code must work for any text file of this format, regardless of the length of the file, as long as each line is not too long.

You can use the code (`p1.cc`) and data (`p1.dat`) provided to get you started.

Submit your code in one file named `lastname_firstname_p1.cc` as an email attachment.

Problem 2: Create a simple class called `Foo` that has a default constructor (no arguments), a default destructor that does nothing and a member function called `myprint` with no arguments that prints “hello world” to `stdout`. The class should also have protected data, declared in this order: (1) a character value as a static char (e.g., “static char d”), (2) a 5-byte character array (e.g., “char str[5];”) and (3) a floating-point character array of 5 values (e.g., “float x[5]”). Create a main program that declares an object of type `Foo` (e.g., `Foo foo`).

Show where in memory each data element is stored for the object `foo`. Show how much memory the entire object `foo` takes (hint: there is some overhead in classes). Comment on what you observe and the implications of your observations.

You can use the code (`p2.cc`) provided to get you started.

Submit your result as a text file named `lastname_firstname_p2.txt` as an email attachment.

Summary: You will submit two files: `lastname_firstname_p1.cc` and `lastname_firstname_p2.txt` as your solution to this exam.