

Sample Assignment 3B, Discussed on 2020-09-28, *Not graded*

Question 1 (Sets/Vectors with Custom Classes)

The code below does the task of EX02: it reads student data from STDIN; outputs the smallest and the largest student compared by age; or by height (if ages are equal).

Question1.cpp

```
1  #include <iostream>
2  #include <iomanip>
3  #include <set>
4
5  using namespace std;
6  struct Student {
7      int age;
8      double height;
9      Student(int aa = 1, double hh = 1):
10         age(aa), height(hh) {}
11
12     friend istream &operator>>(
13         istream &input, Student &S ) {
14         input >> S.age >> S.height;
15         return input;
16     }
17
18     friend ostream &operator<<(
19         ostream &output, const Student &S ) {
20         output << "Student(" << S.age << ", "
21             << std::fixed << std::setprecision(5)
22             << S.height << ")";
23         return output;
24     }
25
26     friend bool operator<(const Student &left,
27         const Student &right) {
28         return (left.age < right.age) ||
29             (left.age == right.age &&
30              left.height < right.height);
31     }
32 };
33
34 int main() {
35     int n; cin >> n;
36     set<Student> myset;
37     for (int i = 0; i < n; i++) {
38         Student student;
39         cin >> student;
40         myset.insert(student);
41     }
42     cout << *(myset.begin()) << endl;
43     cout << *(--myset.end());
44     return 0;
45 }
```

Write short answers to these questions:

- (A) What happens, if Line 43 is rewritten as follows: `cout << *(myset.end());`;
- (B) How would you overload the comparison operation, if you only look at `age`, but order by age alphabetically (as in a dictionary). Namely, age "17" comes before age "2" (since digit "1" alphabetically precedes digit "2"). (*Just show how the Lines 28–30 would look, if you order alphabetically.*)
- (C) Assume that the class `Student` had a destructor. On which line of your code (if at all) is it called, when you read the input containing data for a few students and insert them all in a set.
- (D) Assume that you want to use `std::vector` instead of a set; and output the first and the last element you inserted into a vector. What would you write on Line 40, Line 42 and 43? (How to add something to an end of a vector? How to get the first element? The last element?)