DS_OOP Online Test(2017/06/12)
18:30~21:20 EC315, EC316

Submission:

1. submit <studentID_questionNO.>.h, <studentID_questionNO.>.cpp if you have any(pay attention to the required submission according to each question)
ex: 0516000_1.h, 0516000_2.h, ……
2. upload to e3, we will open it at 9:10~9:20, upload the corresponding file to each question, and you won't compress it.

note: question1 should have header file, but no main function, question2~4 need main function

1. (15%)

Compute fraction operations with operator overloading. (+ , * , / , >> , <<)
Please print the mixed numeral in lowest term or proper fraction in lowest term.
(印出最簡分數的帶分數或是最簡分數的真分數)

Input:

- First line is # of testing data.
- Each line contains 4 numbers (A, B, C, D), and each number is separated by a space. These 4 numbers, A B C D, represent 2 fractions (A/B) and (C/D).
- A, B, C, D are in the range of (0~2^32-1), but B and D will not be zero.

Output:

- If the denominator of the answer is 1, please do not print out the denominator.
- If your answer is 0, just print out 0.
- If your answer is larger than 1, print out integer(numerator/denominator)
- If your answer is smaller than 1, print out numerator/denominator

```cpp
#include <iostream>
#include "Fraction.h"
using namespace std;

int main()
{
    int times;
    cin >> times;

    for(int i=0; i<times; i++){
        Fraction f1, f2;
        cin >> f1 >> f2;

        cout << f1+f2 << endl;
        cout << f1*f2 << endl;
        cout << f1/f2 << endl;
    }
    return 0;
}
```

sample input	3 9 10 9 10 0 2 1 2 4 2 12 3
sample output	1(4/5) 81/100 1 1/2 0 0 6 8 1/2

Submission:

- Do not contain main function in your code. TA will provide the main function and include your file. If you have main function in your code, you will get 0 point.
- Must hand in header file, and if you have cpp file, hand it in as well.
- Do not compress your file
- File name: <studentID_1.h> ex: 0510001_1.h
  If you have cpp file─ < studentID_1.cpp> ex:0510001.cpp

2. (15%)
Given a line of words, reverse the words position in the line.
Each word is separated by a space or more.
Each line will less than 1000000 characters.
The answer of each word is separated by a single space, each answer is in a line.
Read until EOF(end of file)

Please use standard input and standard output to finish this question.
If your program can't stop, you won't get any grades.

Sample input
You are smart Time no seE Wo oop dou ciao ke
Sample output
smart are You seE no Time ke ciao dou oop Wo

3.(40%)
Binary Searh Tree -- preorder(10%)
-- postorder(10%)
-- level-order(10%)
-- find(10%)

All numbers are integer.

Command

-i : insert the following number to the tree
-f : find the following number is in the tree or not
1. if is find in the tree, print "hit s"

a. s is the steps during your search

2. if not find, print “miss”

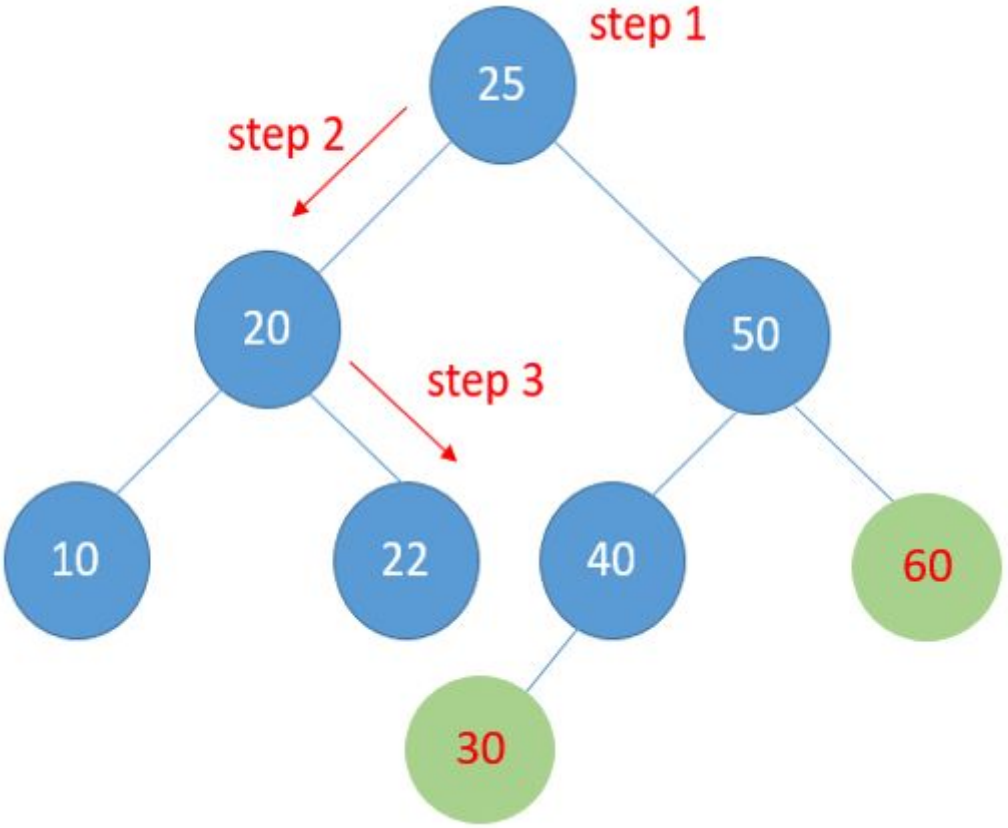
-clear : clear the tree and output “done”
-ppre : print the preorder of the BST
-ppost : print the postorder of the BST
-plevel : print the level order of the BST
-z : last cmd , no need to get the next command

Submission

- hand in your files, TA will not provide main function, you need to write your own main function
- you can write in class or data structure
- if you have header file, please remember to submit
- Use standard input and standard output to finish this question
- Cannot use STL
- You can only include <iostream> and <cstring> library
- If your program can’t stop, you won’t get any grades.

Sample input
i 25 i 20 i 10 i 22 i 50 i 40 i 60 f 25 f 99 f 22 i 30 ppre ppost plevel clear i 10 i 20 i 30 f 40 i 40 ppre ppost plevel f 40 z

Sample output
hit 1 miss hit 3 25 20 10 22 50 40 30 60 10 22 20 30 40 60 50 25 25 20 50 10 22 40 60 30 **done** miss 10 20 30 40 40 30 20 10 10 20 30 40 hit 4



4.(30%)
Please write a program that using an **array** to implement a **Min Heap** with following functions: **insert**, **delete**, **print.**
All numbers are integer.
Command:

- insert:
  insert an element into the heap.
- delete:
  delete the min from the heap.

- print:
  print the array elements from index 1 to N. (N = # of elements in the heap.)

Submission:

- hand in your files. TA will not provide main function, you need to write your own main function.
- If you have header file, please remember to submit.
- Use standard input and standard output to finish this question.
- Read until EOF(end of file)
- Cannot use STL.
- You can only include <iostream> and <cstring> library
- If your program can't stop, you won't get any grades.

Note that: the index 0 is not used.

Sample input
insert 8 insert 20 insert 16 print insert 4 print insert 7 **print** delete **print**
Sample output
8 20 16 4 8 16 20 4 7 16 20 8 7 8 16 20