Lab 2: Part 2. Intelligent Homework Service.

Due date: Wednesday, January 19, 11:59pm.

Lab Assignment

This assignment starts as a Laboratory assignment, and proceeds as Homework 1. This means that you start working on this assignment during the Wednesday, January 12 lab period, but after that period, you will continue working on this assignment on your own time until the due date/time of the assignment. We start Lab 3 on Friday, January 14.

Assignment Preparation

READ THE INSTRUCTIONS FIRST. Please read this document completely **before** you start your work. This document explains to you how to use IHS, the Intelligent Homework Service system, which will provide you with assignments for this lab, some future labs and homeworks, and for the lab tests in this course.

Lab type. Lab 2, Part 2 of the lab is an **individual assignment**.

Collaboration. **No** collaboration is allowed. Each of you will be working on individually generated problems. Do not solicit help from other students.

Purpose. The lab tests your knowledge of C assignment statements. There are two types of tasks you will be asked to perform: reading and understanding the effects of a sequence of assignment statements and simplification of a sequence of assignment statements.

Programming Style. Unlike most other lab assignments, your use of the IHS system is NOT subject to programming style rules. Your submissions are automatically graded based on their correctness, and the grading program does not check for style. More importantly, since you will be writing only **fragments**, no complete C programs, there is no need to enforce style rules.

The Task

For this lab/homework you will use the IHS (Intelligent Homework Service), an on-line system developed by Dr. Clint Staley.

Please read the next part carefully before starting the work on the lab!

IHS, the Intelligent Homework Service

The Intelligent Homework Service (IHS) is located at the following URL:

http://ihs.dynalias.com/IHS

There is a student help web page located at

http://ihs.dynalias.com/IHS/Docs/General/StudentManual.html

Both pages are linked to from the course web page.

IHS Account Information

To work with the IHS website, you need to have an account. The procedure for getting one is outlined below.

Step 1. Open a web browser. Type

http://ihs.dynalias.com/IHS

(or visit the course home page and follow the link from there.)

Step 2. The front page of IHS simply gives you an opportunity to log in. Since you do not have an account yet, follow the `"Register as a student or teacher"` link.

Step 3. Fill in the form that opens as follows:

Field	Information
`Login (email)`	Enter your CalPoly email address
`First Name`	enter your first name
`Last Name`	enter your last name
`Password`	select a password
`Confirm Password`	retype your password
`Register as a teacher`	*leave unchecked*
`Permission Code (for teachers)`	*leave blank*
`Student ID (for students)`	enter your student ID (from your Cal Poly ID card)

Once you fill the form, hit the `"Register Me"` button. If you submitted proper information and your passwords match, an account will be generated, and you will be taken to the *workbook registration* screen.

Workbook Registration

IHS is designed to support multiple courses. A collection of assignments for a single course is called a **workbook**. In order to start working on your CPE 101 assignments you need to sign up for the CPE 101 workbook on IHS.

Step 4. (continued from above) After your account is created, you will be taken to workbook enrollment screen. Fill out the form as follows:

Field	Instruction
`Email of workbook instructor`	Enter `"adekhtyar@calpoly.edu"` (no quotes - and note that the email there is "adekhtyar"!)
`Workbook name`	Enter `"Zoom Zoom Zoom"` (no quotes)
`Workbook code`	*leave blank*

Work on Assignments

Step 5. Once you are successfully registered for the `Zoom Zoom Zoom` workbook, you will see a web page that lists the contents of the workbook for you. Currently, the workbook has one assignment in it: `Lab 2-2`.

Follow the "Work on this assignment" link for the `Lab 2-2` assignment..

Step 6. You will see the page detailing the assignment. When you access this page first, the following information will be displayed:

#	**Problem description**	**Pts**	**Next Try allowed**	**Attempts**
1	Assignments Warm-up	10	Any time	0
2	Assignments Easy	10	Any time	0
3	Assignments Somewhat harder	10	Any time	0
4	Assignments Moderate	10	Any time	0
5	Assignments Moderate-to-Hard	10	Any time	0
6	Assignments Hard	10	Any time	0
7	Assignments Extra Credit	10	Any time	0

There will also be a `"Work on current attempt"` link next to each part of the assignment. Each line represents a tier of problems within the lab.

The problems

To start working on any of the problem tiers click the `"Work on current attempt link"` of the appropriate tier. Each tier of problems can be accessed independently of other tiers.

IHS automatically generates unique problems each time you start working on a new attempt. Two different students working on the same problem tier will see somewhat different problems of the same difficulty.

Each tier consists of a linked pair of problems. We refer to the first problem you see as the Code reading problem and the second problem as the Simplification problem.

Code reading problems. The first type of a problem in each tier is a code reading problem. A code reading problem offers a simple C program in which a number of variables is declared, some of these variables are read in using the `scanf()` function call, and the values of all variables are then modified in a sequence of assignment statements. The last part of the program is a `printf()` statement, which prints the values of some of the variables.

Your task (found below the program) is, given the values of the variables obtained from the `scanf()` statement, compute and submit the values of the variables that will be printed by the `printf()` statement.

Example. A simple assignment can look as follows. You are given the following program:

```
#include <stdio.h>

int main() {

 int a,b,c,d;

 scanf("%d%d", &a, &b);

 c = 2*a;
 c = a - b;
 d = a + b;

 printf("%d, %d\n", c, d);
 return 0;
}
```

```
a: 5
b: 3
c: _____
d: _____
```

To solve this problem, you are asked to **hand trace** the values of all the variables through the execution of the program. In particular, you first set the value of `c` to be `2*a = 10`; then you set `c` to be `a-b = 5 - 3 = 2`. Then you set the value of `d` to be `a+b = 5 + 3 = 8`.

After that, you report to the IHS that the value of `c` is 2 and the value of `d` is 8.

Simplification problems. After you have successfully solved the code reading problem, you will be offered a matching simplification problem. You will be asked to simplify the program from the code reading problem. Here, *"to simplify"* means *"to create another program that uses fewer characters/lines of code but produces the same result"*.

The IHS page for the simplicication problem will provide you with a starter for your program (the `int main()` header, and the `return 0;` statement), and with some variable declarations and the `scanf()` statement. You are asked to (a) write a sequence of the assignment statements that is "shorter" than the orginal and (b) fill in the variable names in the final `printf()` statement.

For your convenience, the code for the original program is provided to you below on the page.

Example. After you solve the sample problem above, the matching simplifcation problem will ask you to make that program smaller. In particular, it will be reported to you, that the assignment statements in the program consume 15 symbols. You will be asked to write a sequence of assignment statements that leads to the same result, but consumes only 11 symbols (characters) or fewer.

To solve this problem, you can notice that the first assignment statement is redundant, as its effects are never observed: the value of `c` is modified in the very next statement. Therefore, the first assignment statement can be removed from the program. You will supply the following two assginemnt statements:

```
c = a - b;
d = a + b;
```

and will insert `c` and `d` into the text fields in the `printf()` statement.

Submitting solutions. Each problem gives you three tries to successfully complete it. After you write in your solution to the problem, press the `Submit` button. In the followup pages, you will be provided grading feedback. If your solution to a code reading problem was correct, you will be taken directly to the page detailing the matching simplification problem. If your simplification problem was correct, you will see an message outlining your success and will be asked if you are satisfied with your current performance. If you submit to the system that you are satisfied, you will be returned to the assignment page.

If you submit an incorrect solution, you will be taken to the page with the current problem. Some feedback detailing why your solution was incorrect (compiler error, incorrect answer, missing information, etc) will be provided, and your next attempt will start. *After three incorrect attempts, IHS will abandon your current problem and present you with another problem of the same difficulty level.* If you were working on a simplification problem, your current simplification problem will be abandoned, and you will be given a new code readng problem to solve. You will need to solve the code reading problem before you can advance again to the simplification problem.

Problem Tiers

Each problem tier from the lab assignment page represents a set of problems of increased difficulty as compared to the earlier tiers. The first (warm-up) tier contains very simple code reading, and easy/obvious code simplification problems. The second tier contains slightly more complex problems — more variables, more assignment statements — and so on.

While you can attempt each problem tier independently of other tiers, it is recommended that you do them in order from top to bottom.

Grading

You **must complete the first four tiers** to receive full credit for this lab/homework. A tier is completed when you successfully solve both the code reading and the matching simplification problem from the tier. You have umlimited tries at each tier, subject to problems changing every three incorrect attempts.

Successful completion of Tier 5 adds 10% to your score.

Successful completion of Tier 6 adds 15% to your score.

Successful completion of Tier 7 adds 20% to your score.

To receive proper credit for your work, your assignments must be completed by the end of the day Wednesday, January 19.

Please note, that you will be working on other lab assignments starting January 14, and will potentially have other assignments due on that day as well. It is in your best interest to complete this assignment as fast as you can.