SI 413 Fall 2012: Homework 9

Your name:

Due: Monday, 19 November, before class

Instructions: Review the course honor policy for written homeworks.

This cover sheet must be the front page of what you hand in. Fill out the left column in the table to the right after we go over each problem in class, according to the rubric below.

This rubric is also on the website, in more detail, under "Other Stuff"→"Grading Rubrics".

Problem	Self-assessment	Final assessment
1		
2		

Make sure all problems are submitted IN ORDER.

- **5**: Solution is completely correct, concisely presented, and neatly written.
- **4**: The solution is mostly correct, but one or two minor details were missed, or the presentation could be more concise.
- **3**: The main idea is correct, but there are some significant mistakes. The presentation is somewhat sloppy or confused.
- **2**: A complete effort was made, but the result is mostly incorrect. There may be some basic misunderstandings of the topic or the problem.
- **1**: The beginning of an attempt was made, but the work is clearly incomplete.
- **0**: Not submitted.

Comments or suggestions about this homework:

Comments or suggestions about the course so far:

Citations (other students, websites, . . .):

Use a separate sheet of paper for your answers! Everything should be submitted in one packet, all printed out for me to see.

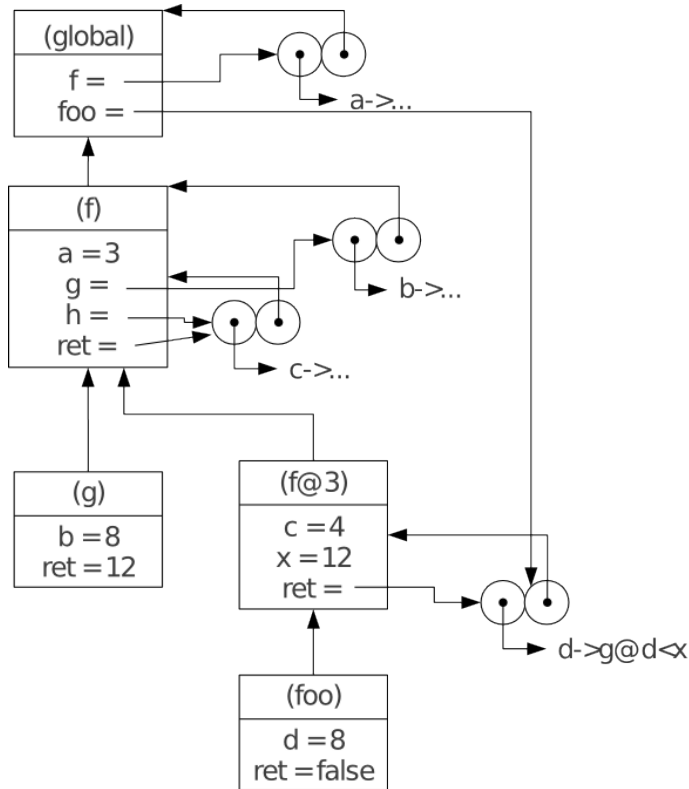# 1   Recycling Boxes

Consider the following SPL code:

```
new f := lambda a {
  new g := lambda b { ret := b + b/2; };
  new h := lambda c {
    new x := a*c;
    ret := lambda d { ret := g@d < x; };
  };
  ret := h;
};
new foo := f@3@4;
write foo@8;
foo := 20;
```

Here are the frames and closures that exist *just before the last line is executed*. (Note: it would be good practice to see if you could recreate this diagram yourself!)

a) Using the labels of each frame above, indicate what the reference count for each frame is at this point in the program.

b) Repeat (a), showing what happens after the last line in the program is executed.

c) Using the labels of each frame above, indicate which frames would be garbage collected at this point using the *mark and sweep* method.

d) Repeat (c), showing what happens after the last line in the program is executed.

2 Hello, world!

Write a C++ program that prints (exactly) the string "Hello, world!" (followed by a newline), and demonstrates assignments using as many different kinds of l-types that you can in C++.

For full credit, your assignments should be somehow meaningful or useful. So for example, the program

```
int a = 3;
a++ = 29;
cout << "Hello, world!" << endl;
```

would not receive full credit, because the assignments with `a` had nothing to do with the output. Something like

```
string s = "Hello, vorld!";
s[7] = 'w';
cout << s << endl;
```

would be more like it. But of course you will need to have more assignments than this to demonstrate all the different kinds of l-values!

Print out your code and turn it in, labeling all the different l-values that you use.

In addition, you must submit your code electronically. Name your file `ex2.cpp` and submit using the command `413sub hw 09`.