322 Compilers: Assignment 2a
Register allocation, getting started

Due Thursday April 29th, before class

Your jobs: Implement liveness analysis and spilling. More precisely, implement these two functions:

```
spill : (i ...) var offset[multiple of 4] var -> (i ...)
liveness : (i ...) -> ((in (var ...) ...)
                       (out (var ...) ...))
```

The `spill` function accepts a L2 function (as a list of instructions), the name of a variable, and an offset into the stack, a prefix for the names of the spill variables, and returns a new program that spills the variable to that location in the stack. You can assume that no variable in the program begins with the spill variable prefix and you should use that prefix for any variable you spill. The first occurrence of a spill variable should have that prefix followed by the number `0`, and the second the same prefix followed by the number `1`, etc.

The `liveness` function accepts an L2 function (as a list of instructions), and returns the "in" and "out" sets for each instruction, as a sequence of variables. The variables in each list must be sorted alphabetically, and each sequence of variables must correspond to an instruction in the input function.

Design test cases for those functions as files using the format described below.

Handin instructions: Wrap up each of your functions into scripts that accept a filename (whose contents is the sequence of instructions) naming a file that contains the arguments in the file. The scripts should write their answers to stdout. For example, if the file `f.L2f` contains:

```
((x <- 1) (eax += x)) x -4 s_
```

Then this this transcript would show how your scripts should behave (the `liveness` script just ignores what follows the program):

```
% spill f.L2f
(((mem ebp -4) <- 1)
 (s_0 <- (mem ebp -4))
 (eax += s_0))
% liveness f.L2f
((in (eax) (eax x)) (out (eax x) ()))
```

Your scripts must run on the t-lab machines (under linux).

Hand in your assignment by sending email with the subject `2a` to `robby@eecs.northwestern.edu`. The email should include a `.tar.gz` attachment that contains (at the top-level) the `spill` and `liveness` executables and a directory called `test` containing your test files. The input files should use the suffix `.L2f` and the correct answers should use the suffix `.sres` for the spill function's results and `.lres` for the liveness function's results..

Note: if you do not follow the instructions above, you will lose 1 point (out of 10) and have 24 hours to try again to submit something that does follow the instructions (after that, no credit).