CSI 465 Compiler Design

LAB 1: Introduction to Frances

Objectives:

a) Become familiar with the Frances tool.
b) Understand the components Frances.
c) Introduce some syntax of a low level language.
d) Understand memory allocation and register use.

1) Background: Frances is a tool developed to help in the understanding of code generation. Frances can be found at http://frances.cs.iastate.edu/. For most of our exercises we will use the C language for the high-level language. This is Frances' default language. Use it unless otherwise directed.

2) Exercises:
   a) We have discussed the code generated for the program that does nothing. Below is the generated assembly code for such program. Label each line below with a description of the assembly code and a brief explanation of its purpose in the program.

main

```
lea   0x4(%esp),%ecx
and   $0xfffffff0,%esp
pushl      -0x4(%ecx)
push       %ebp
mov        %esp,%ebp
push       %ecx
pop   %ecx
pop   %ebp
lea   -0x4(%ecx),%esp
ret
```

b) Next, write the following code in Frances.

```
int main(){
  int x, j;
  float a;
  x = 7;
  a = 5.2;
  j = 3;
  if (j < x)
    a = 4.6;
}
```

i) For each *assignment* statement and the *if* statement above, write the corresponding assembly code next to it.

ii) What denotes a memory address? What denotes a value? What denotes a register?

iii) Name the memory locations of x, j and a, in hexadecimal and in decimal.