17-355/17-655/17-819: Program Analysis
Recitation Activity
January 18, 2019 **Andrew ID: _____**

1.

a) Use the abstract syntax for WHILE presented in class and in recitation to write a simple (3-4 statement) program. Use either an if statement or while statement at least once in your program.

b) Translate the program you wrote in the WHILE language into a program written in the WHILE3ADDR language.

2. Use the bad shift analysis algorithm presented in class and in recitation to analyze the following JIMPLE program. List the instruction number of any instructions that produce a warning about a bad shift operation.

0. int a, b, c, d, e, f;
1. a = 269488144; // 0x10101010 in the concrete representation
2. b = a << 5;
3. c = a >> 32;
4. d = a >>> -1;
5. e = a >> 0;
6. f = a >>> 31;

3. Use the big-step operational semantics rules for the WHILE language to write a well-formed derivation with $\langle y := 3; if\ y > 1\ then\ z := y\ else\ z := 2, E\rangle \Downarrow E[y \mapsto 3][z \mapsto 3]$ as its conclusion. Therefore, $\langle y := 3; if\ y > 1\ then\ z := y\ else\ z := 2, E\rangle \Downarrow E[y \mapsto 3][z \mapsto 3]$ is provable. Make sure to indicate which rule you used to prove each premise or conclusion.