Quiz 3

EECS665 - Compiler Construction
2020, Fall

Name: _____   Student ID: _____

TAKE HOME QUIZ

You **must** work on the quiz on your own.
- Do not discuss your answers with other students
- Do not check your answers with other students
- Do not show your quiz to any other students

Before you answer the questions:

- Read all of the instructions on this page
- Write your name and student ID on this page

The Quiz is due **on Blackboard** by 3:00 on November 6th. You may upload a scan/picture of version of this document with your answers, write your answers on separate sheets of paper, or use a software program to create written answers / diagrams of your answers. Total

Questions: 5
Total Pages: 6
Total Points: 50

Feel free to draw something spooky
in the box below
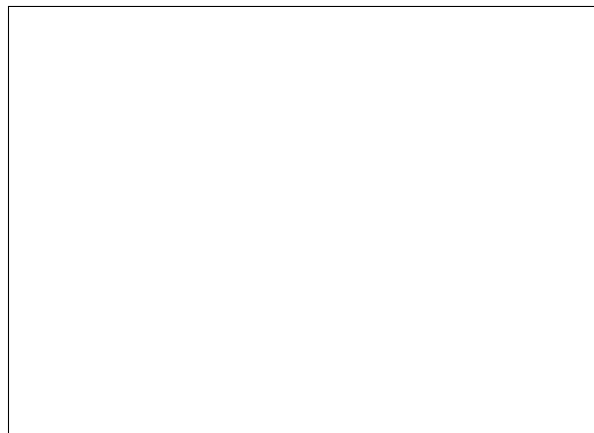
QUESTION 1 (10 POINTS)
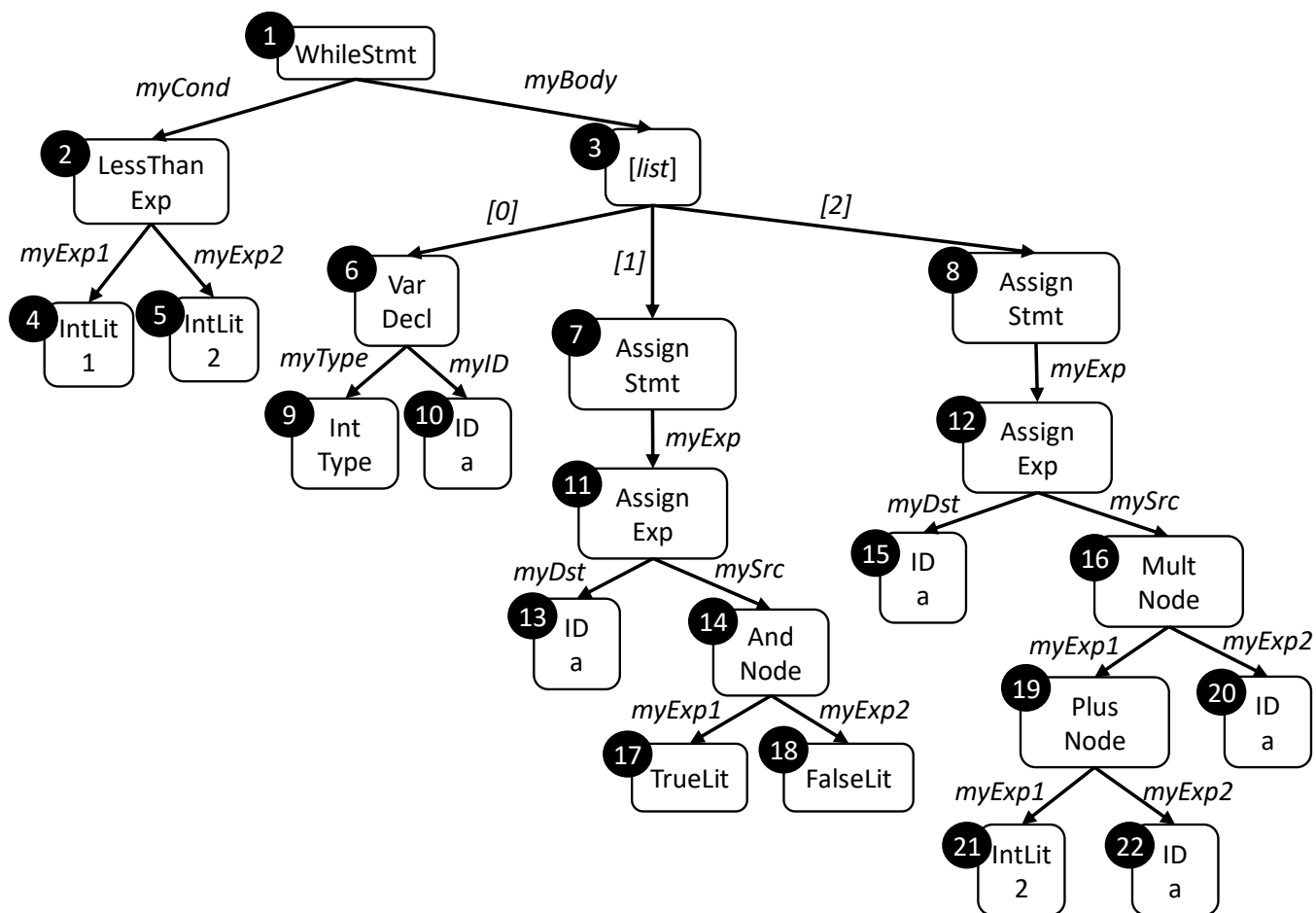
Translate the following program into 3AC

```
int spook(int arg){
        if (arg != 2){
                return spook(spook(arg - 1));
        }
        return 2 + arg * 2;
}

int main(){
        int a;
        return spook(2);
}
```

For each AST node, indicate the node's type and whether it an error would be reported there

1. type: _____ report: y/n   12. type: _____ report: y/n

2. type: _____ report: y/n   13. type: _____ report: y/n

3. type: _____ report: y/n   14. type: _____ report: y/n

4. type: _____ report: y/n   15. type: _____ report: y/n

5. type: _____ report: y/n   16. type: _____ report: y/n

6. type: _____ report: y/n   17. type: _____ report: y/n

7. type: _____ report: y/n   18. type: _____ report: y/n

8. type: _____ report: y/n   19. type: _____ report: y/n

9. type: _____ report: y/n   20. type: _____ report: y/n

10. type: _____ report: y/n   21. type: _____ report: y/n

11. type: _____ report: y/n   22. type: _____ report: y/n

Consider the AST from Question 2, with each statement that has an error in it removed (if any such statements exist). Show the x64 code corresponding to the AST.

Assume the below diagram represents a snapshot of a portion of stack memory, including the activation records of two functions, foo and bar such that:

- foo calls bar
- bar has 1 formal argument

0x8000	0x8008	0x8010	0x8018	0x8020	0x8028	0x8030	0x8038
1	2	0x4036	???	2	???	???	
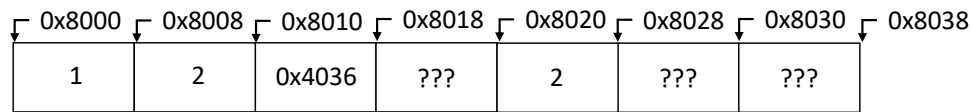
%rsp: 0x8000
%rbp: 0x8020

Write out a HoleyC source code program compiled under the allocation scheme described in class such that the above stack memory snapshot could appear. Also indicate the point in the program for the snapshot. (*you may include other functions and assume that other stack memory exists that is not depicted in the above diagram*). newpage

Consider the following function:

```
int kooky(int arg){
        int a;
        int b;
        bool c;
        return a + b * c - arg;
}
```

Write out the x64 function prologue for kooky using the allocation scheme described in class. Explain the purpose of each x64 instruction.

Write out the x64 function epilogue for kooky using the allocation scheme described in class. Explain the purpose of each x64 instruction.