

Exercises marked with a ★ involve coding. These exercises do not have accompanying solutions. You are encouraged to work them out on your own. If you need help with any of them, please reach out to the course staff.

**Exercise 1 (★).** Suppose we wish to add support for the  $\geq$  comparison operator in  $j$ -. What changes will you need to make in the handcrafted scanner?

**Exercise 2 (★).** Suppose we wish to add support for the do-statement in  $j$ -. What changes will you need to make in the handcrafted scanner?

```
statement ::= block
           | DO statement WHILE parExpression SEMI
           | IF parExpression statement [ ELSE statement ]
           | RETURN [ expression ] SEMI
           | SEMI
           | WHILE parExpression statement
           | statementExpression SEMI
```