

Total score:

3+4+2+

5+4+0+

4+0+

2

= 24 points

1.

GRADE 4

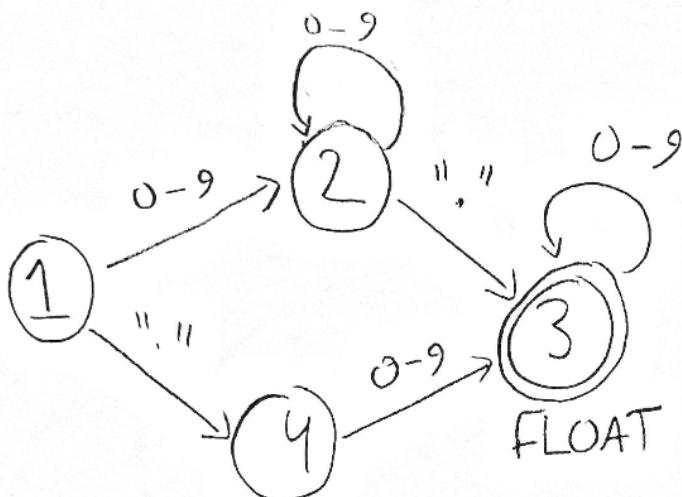
Charlie Mrad
ch3045mr-s

a)

$$\text{FLOAT} = [0-9]^* ". "[0-9] + | [0-9]^* ". "[0-9]^*$$

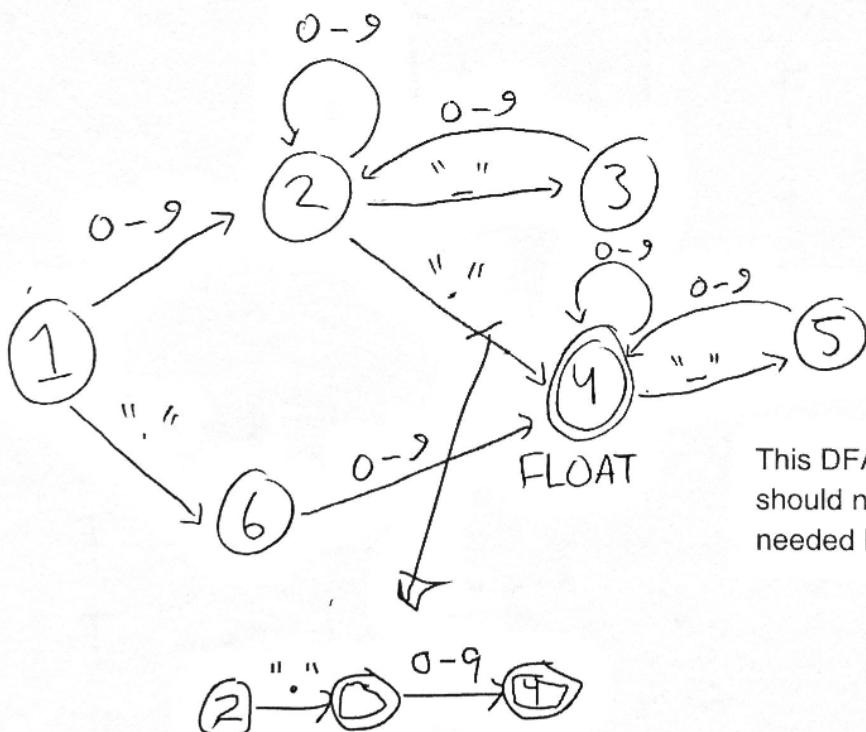
3p

b)



4p

c)



This DFA will accept 7._8, which it should not. One more final state is needed between 2 and 4.

2p

2.

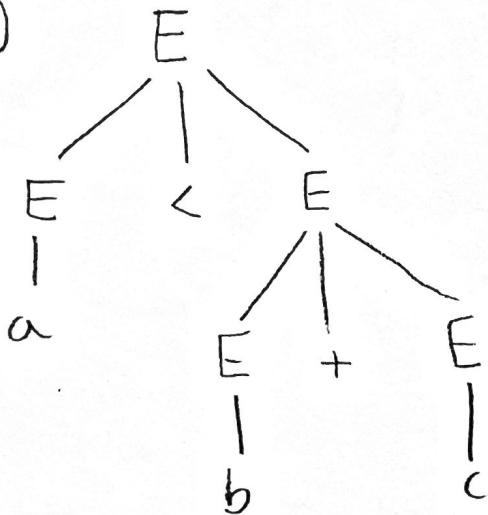
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ch3045mr-s

a) Take for example the sentence:

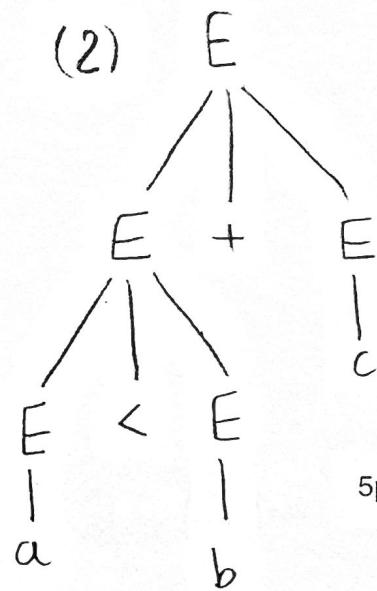
$$a < b + c$$

the parse trees can be either (1) or (2)

(1)



(2)



5p

b)

$$E \rightarrow T$$

$$E \rightarrow T \ " < " \not\in T$$

Because "<" should be non-associative.

$$T \rightarrow F$$

$$T \rightarrow T \ "+" \ F$$

$$T \rightarrow T \ "-" \ F$$

$$F \rightarrow "(" \ E \ ")"$$

$$F \rightarrow ID$$

4p

c) missing: 0p

Charlie Mrach

ch3045mr-s

3.

a) inh ClassDecl ClassUse.decl();

eq

```
ClassDecl.getSuper().decl() {
    for (ClassDecl d : decls()) {
        if (getSuper().getId().equals(
            d.getId())) {
            return d
        }
    }
    return null;
}
```

inh List<ClassDecl> ClassDecl.decls();

eq

```
Module.getClassDecl(int i).decls() =
getClassDeclList();
```

The solution works, but is not so elegant: It works only specifically for ClassUses in the getSuper position. The equation will have to be repeated if there are more ClassUse occurrences in the grammar, for example in a "new" expression.

Charlie Mrach
ch3045mr-s

3.

- b) Using the decls() attribute from part
a) you can write subclasses() as
the following

```
syn HashSet<ClassDecl> ClassDecl.subclasses() {  
    HashSet<ClassDecl> subs = new HashSet<ClassDecl>()  
    for (ClassDecl d : decls()) {  
        if (d.hasSuper() && d.getSuper().getID().equals(  
            getID())) {  
            subs.add(d);  
        }  
    }  
    return subs;  
}
```

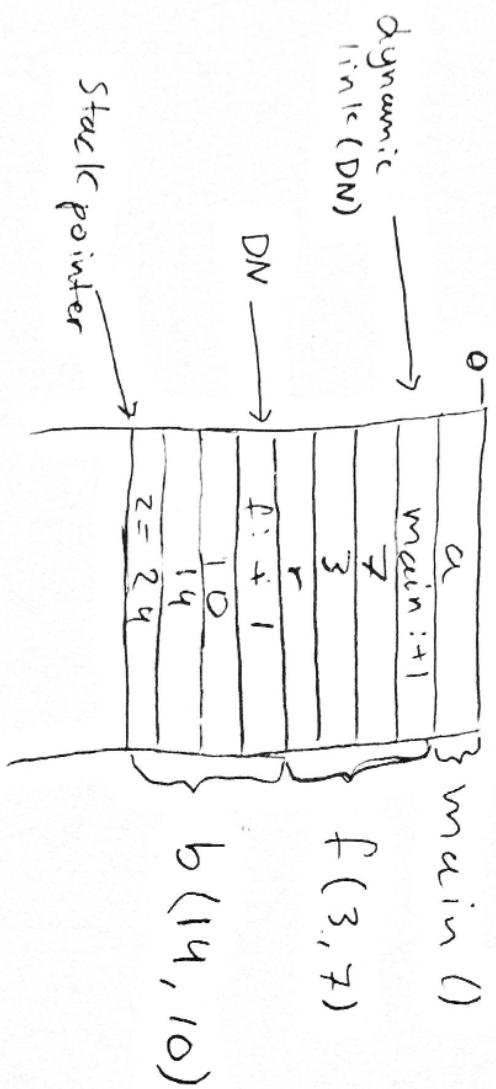
Does not use a collection attribute.

Will not work for other ClassUses in the grammar. Op

Charlie Mirek

ch3045mr - 5

4.



- missing framepointer
- unclear values dynamic links - where do they point to?
- unclear placement of dynamic links - should be before local variables
- missing return address slots - ok - not asked for