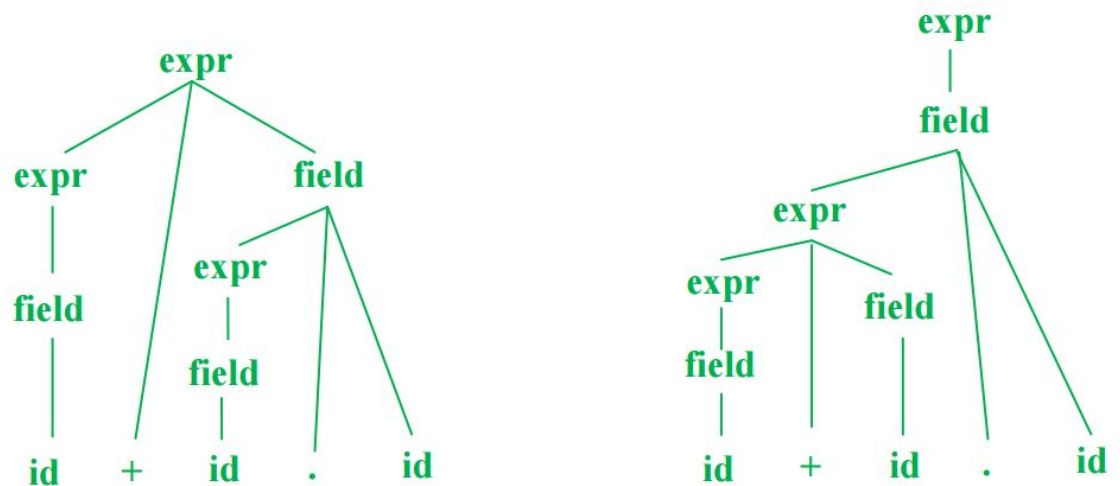# CSE 401 - Ambiguity Worksheet - Week 2 - Solutions

1. Consider the following syntax for expressions involving addition and field selection:

```
expr  ::= expr + field
expr  ::= field
field ::= expr . id
field ::= id
```

a) Show that this grammar is ambiguous.

Here are two derivations of id+id.id:

b) Give an unambiguous context-free grammar that fixes the problem(s) with the grammar in part (a) and generates expressions with `id`, field selection, and addition. As in Java, field selection should have higher precedence than addition and both field selection and addition should be left-associative (i.e. `a+b+c` means `(a+b)+c`).

The problem is in the first rule for *field*, which creates an ambiguous precedence. Here is a reasonably simple fix.

expr ::= *expr* + *field*
expr ::= *field*
field ::= *field* . `id`
field ::= `id`