

Compiler  
Assignment 4  
Context-Free Grammars

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# 1 Question 1

a)

Terminals: or, and, not, true, false, (, )

Non-terminals: bexpr, bterm, bfactor

Start symbols: bexpr

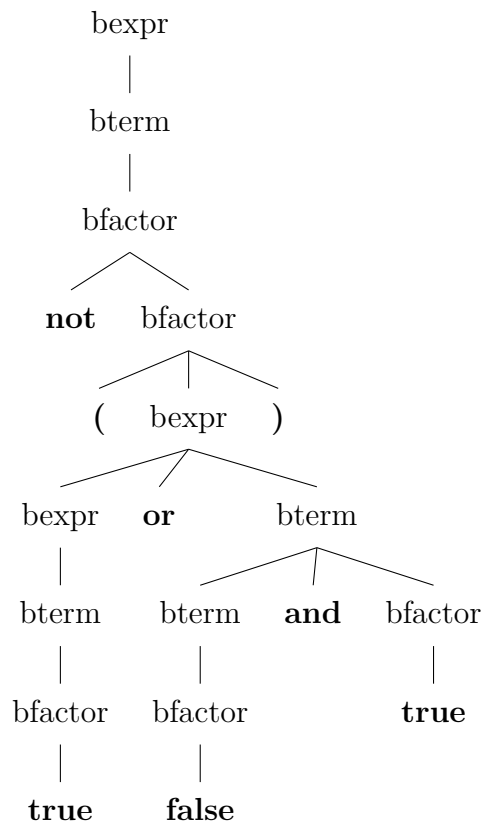
b)

1. bexpr
2. bterm
3. bfactor
4. **not** bfactor
5. **not** (bexpr)
6. **not** (bexpr **or** bterm)
7. **not** (bterm **or** bterm)
8. **not** (bfactor **or** bterm)
9. **not** (**true** **or** bterm)
10. **not** (**true** **or** bterm **and** bfactor)
11. **not** (**true** **or** bfactor **and** bfactor)
12. **not** (**true** **or** **false** **and** bfactor)
13. **not** (**true** **or** **false** **and** **true**)

**c)**

1. bexpr
2. bterm
3. bfactor
4. **not** bfactor
5. **not** (bexpr)
6. **not** (bexpr **or** bterm)
7. **not** (bexpr **or** bterm **and** bfactor)
8. **not** (bexpr **or** bterm **and** **true**)
9. **not** (bexpr **or** bfactor **and** **true**)
10. **not** (bexpr **or** **false** **and** **true**)
11. **not** (bterm **or** **false** **and** **true**)
12. **not** (bfactor **or** **false** **and** **true**)
13. **not** (**true** **or** **false** **and** **true**)

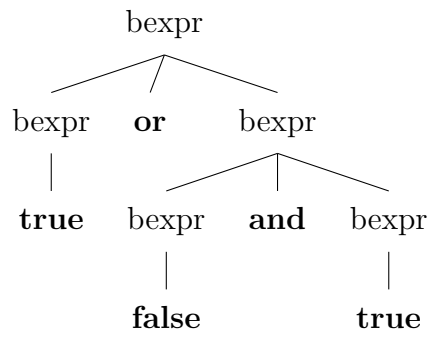
d)



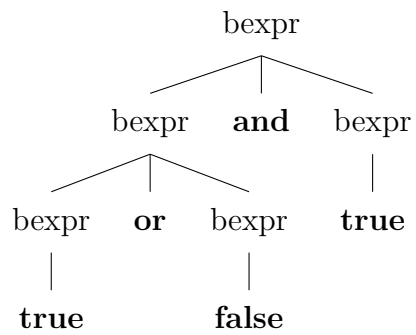
## 2 Question 2

以 true or false and true 來看

### Tree 1



### Tree 2



### 3 Question 3

a)

Rules are:

1.  $expr \rightarrow \epsilon$
2.  $expr \rightarrow 1expr$
3.  $expr \rightarrow 01expr$

b)

For strings 10, 01, 1100, 0011, 1001, 0110, ...

Rules are:

1.  $expr \rightarrow \epsilon$
2.  $expr \rightarrow 0expr1$
3.  $expr \rightarrow 1expr0$
4.  $expr \rightarrow 10expr$
5.  $expr \rightarrow 01expr$
6.  $expr \rightarrow expr10$
7.  $expr \rightarrow expr01$