Answers to Questions 1 – 6 can be found in your class notes or course notes.

7. 2. <signed int> → (+|−){<digit>}$^{+}$

8.

1. The invalid ones are marked with ×.

   8ABC (×) CS316 CS316_ (×) CS316_ABCX
   _CS316 (×) CS316_ _ABC (×) CS316_987 CS316_ABC_32A
   CS316_543_7B5 CS316_A_ (×)

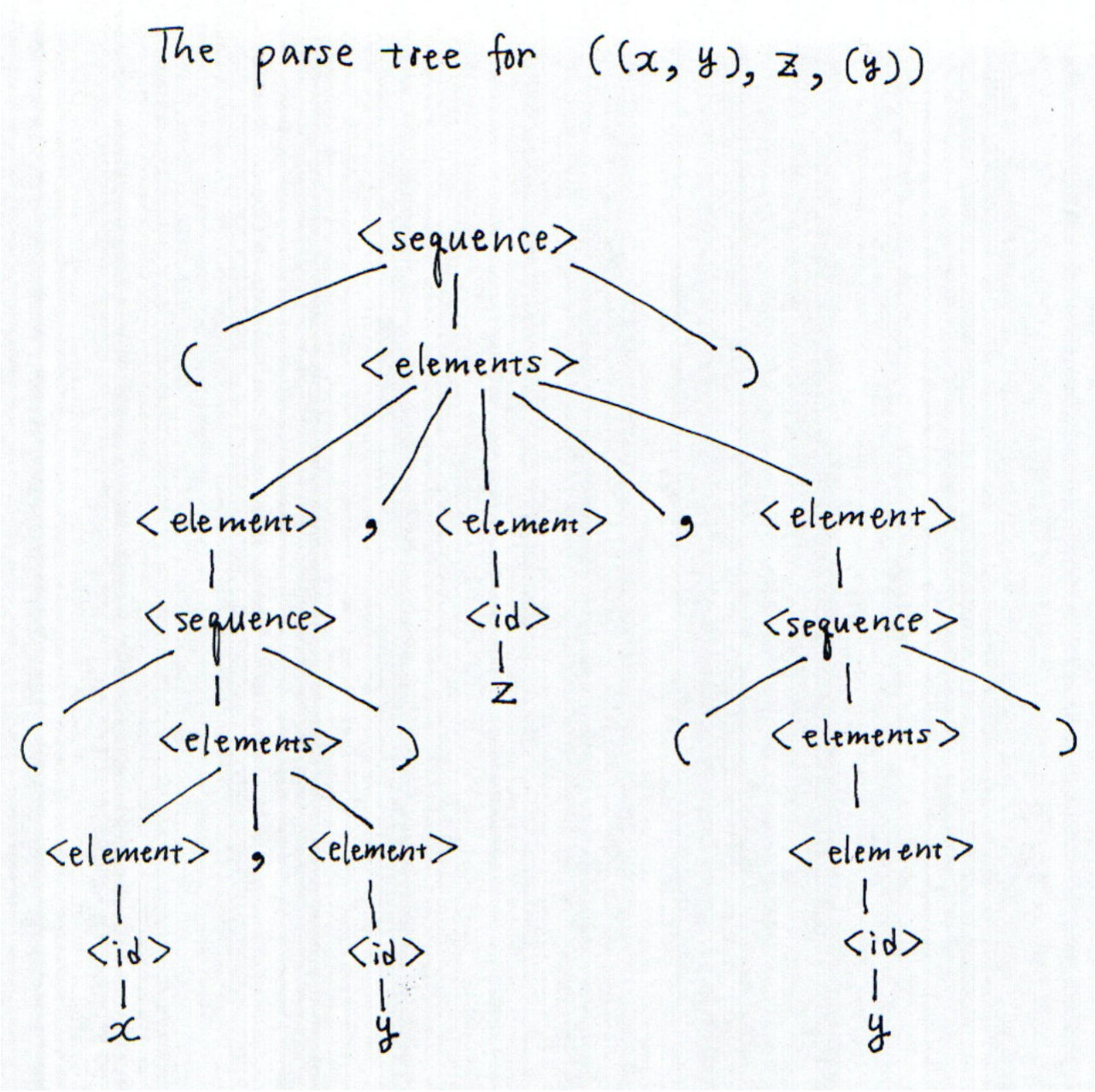
2. The following is one of possible correct grammars.

   <id> → <letter> <rest of id>
   <rest of id> → ε | <letter> <rest of id> | <digit> <rest of id>
   <extended id> → <id> <rest of extended id>
   <rest of extended id> → ε | "_" <letters and digits> <rest of extended id>
   <letters and digits> → <letter> | <digit > | <letter> <letters and digits> | <digit> <letters and digits>

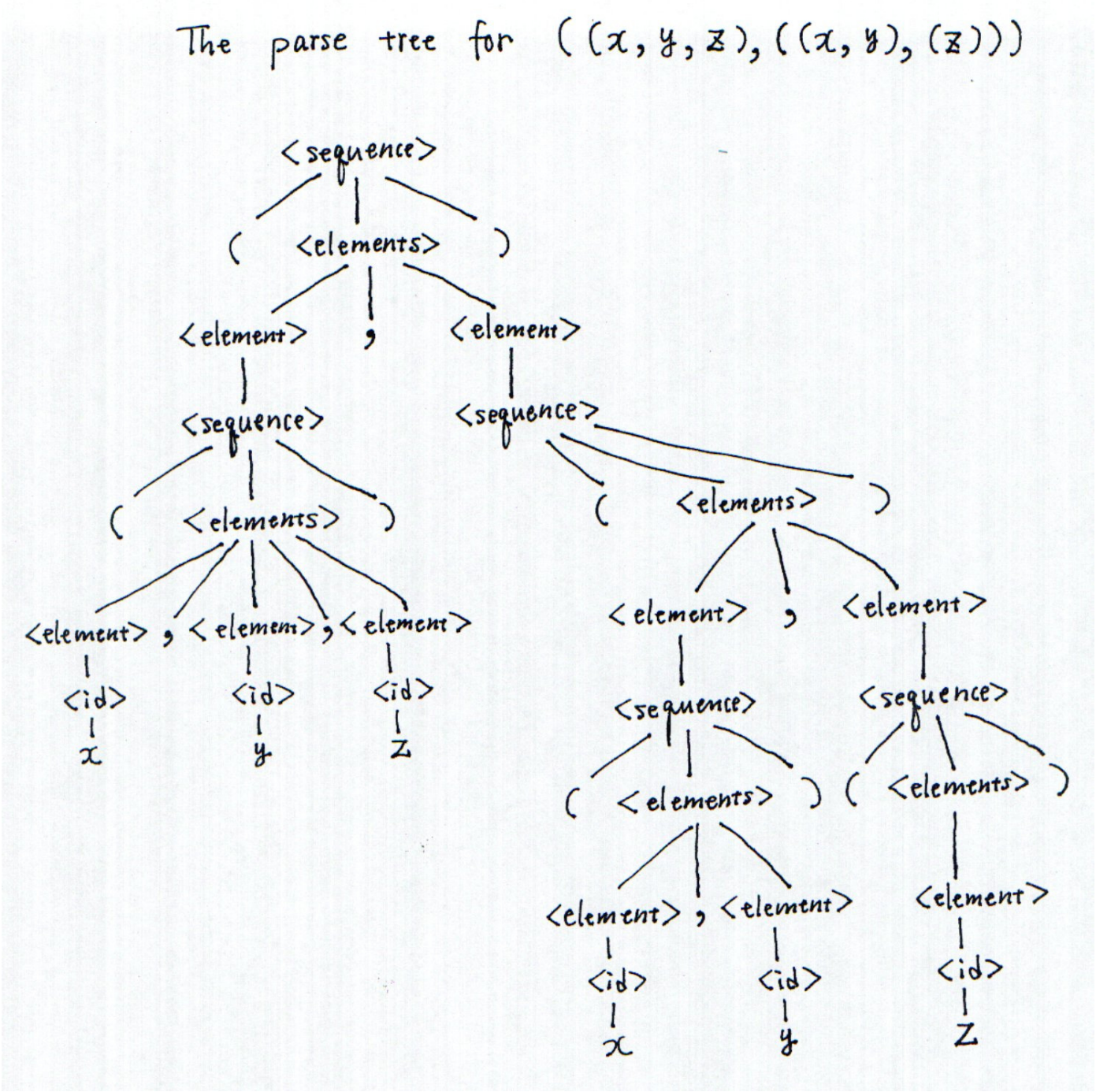
9. The invalid ones are marked with ×.

.e1 (×) .2e (×) .2e3 .45E−32 3.2145e10 768.43 2709 (×)
2709. (×)
−.562e2 +34E+5 (×) −65.67 75647.74653e− (×) 756.65e−7564
+.64−8 (×)

10.
1.
( ) invalid
(xyz) valid, parse tree not shown
(x, y, z) valid, parse tree not shown
((x, y), z, (y)) valid



(x) (y) invalid
((x, y, z), ((x, y), (z))) valid



x) y) z invalid

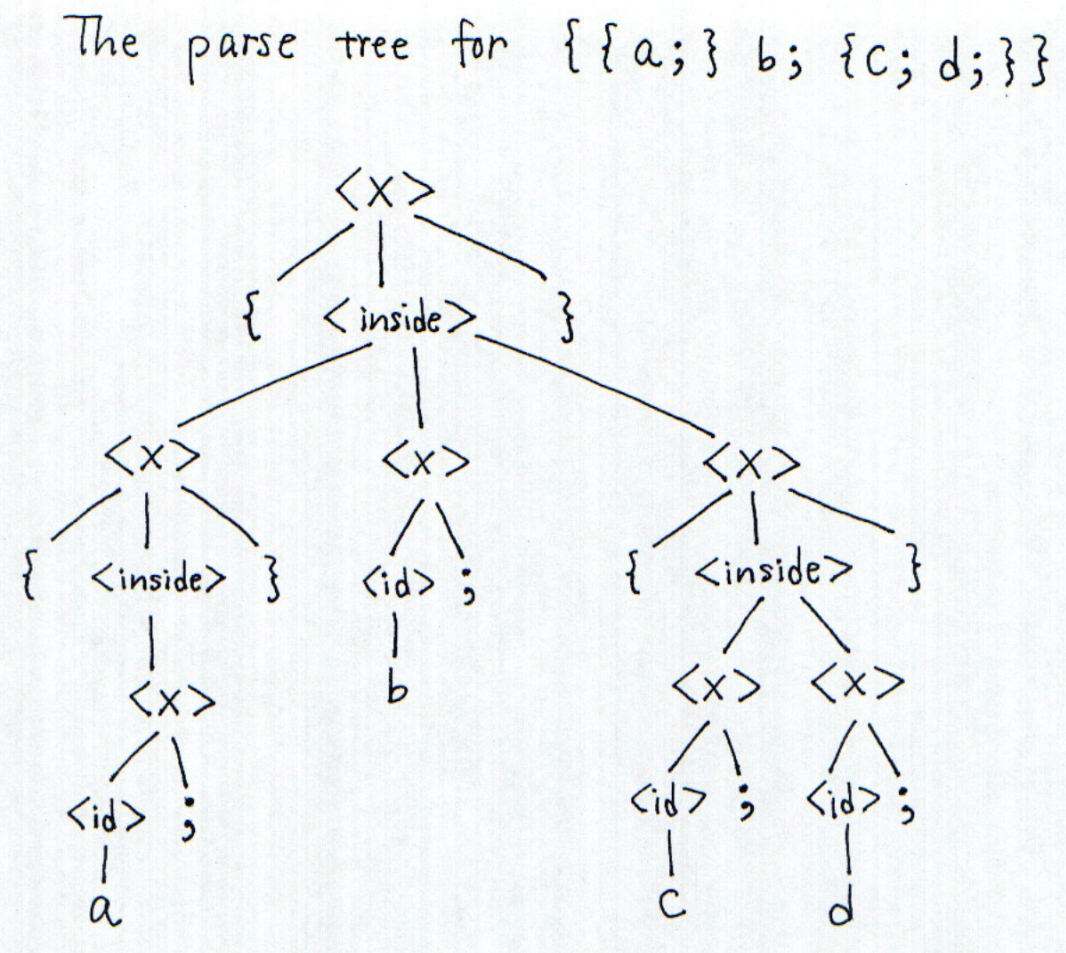
2.

<elements> → <element> | <element> "," <elements>

11.

{ a; b; c; } valid, parse tree not shown
{ a b { invalid
{ a; { b; c; } } valid, parse tree not shown
} a; b; { invalid

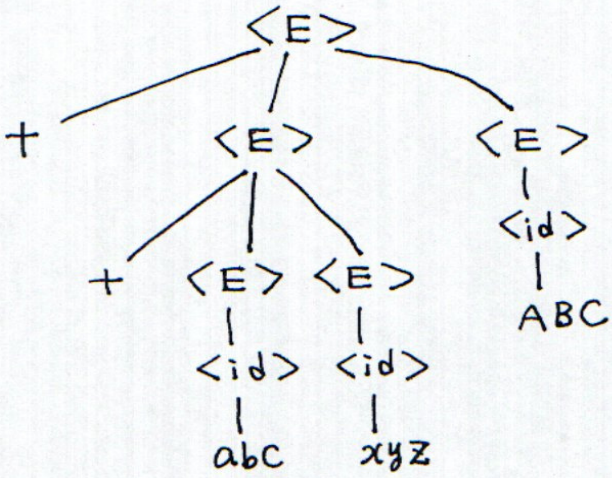
{ { a; } b; { c; d; } } valid



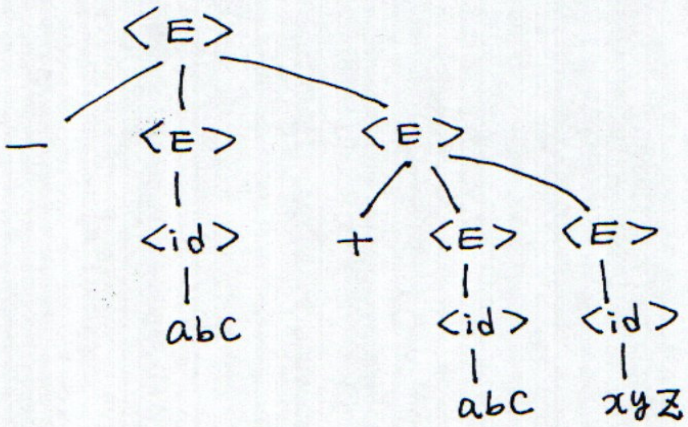
12.

abc valid, parse tree not shown
\+ abc xyz valid, parse tree not shown
\+ + abc xyz ABC valid, parse tree below
− abc + xyz invalid
− abc + abc xyz valid, parse tree below

The parse tree for + + abc xyz ABC

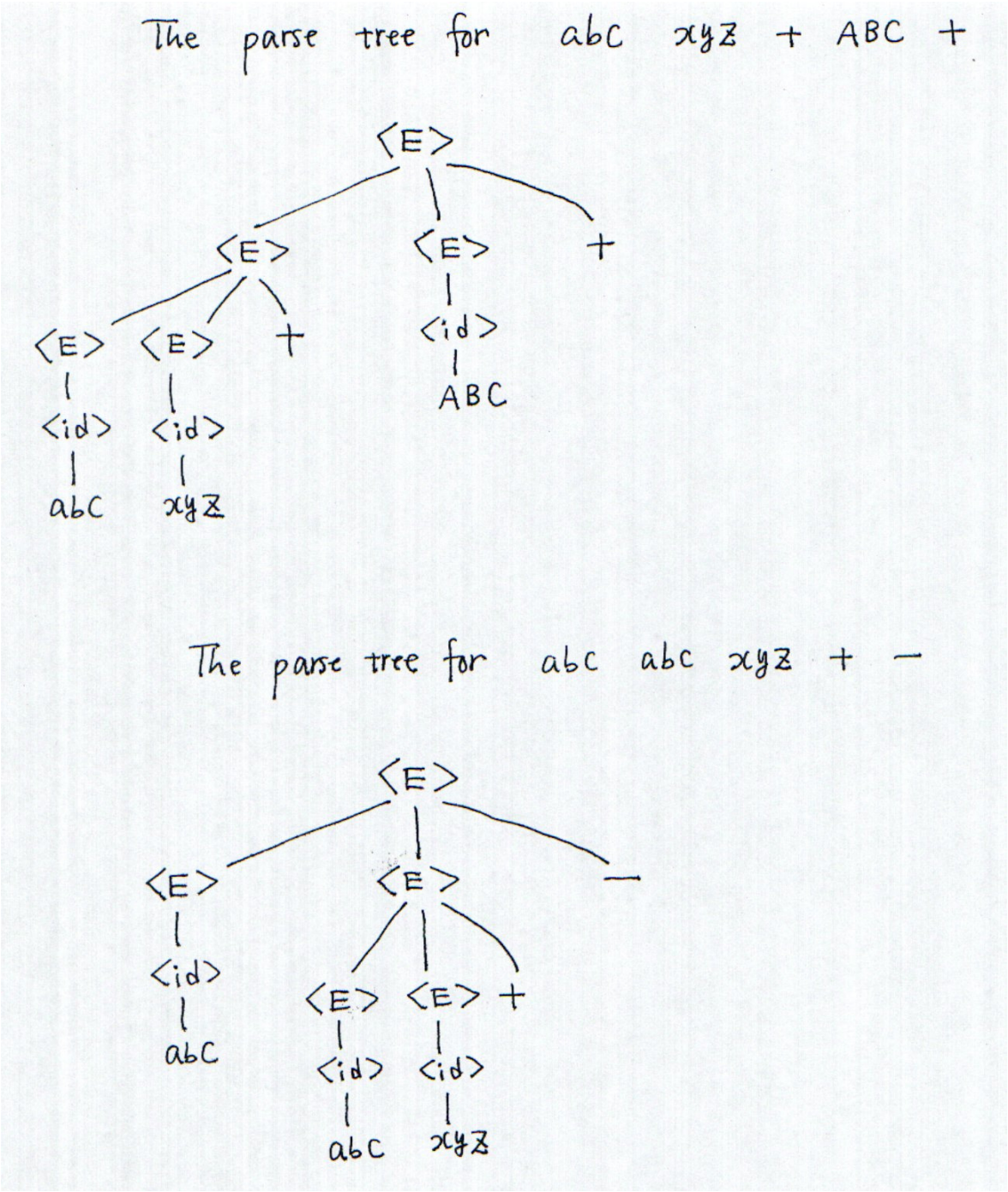


The parse tree for − abc + abc xyz



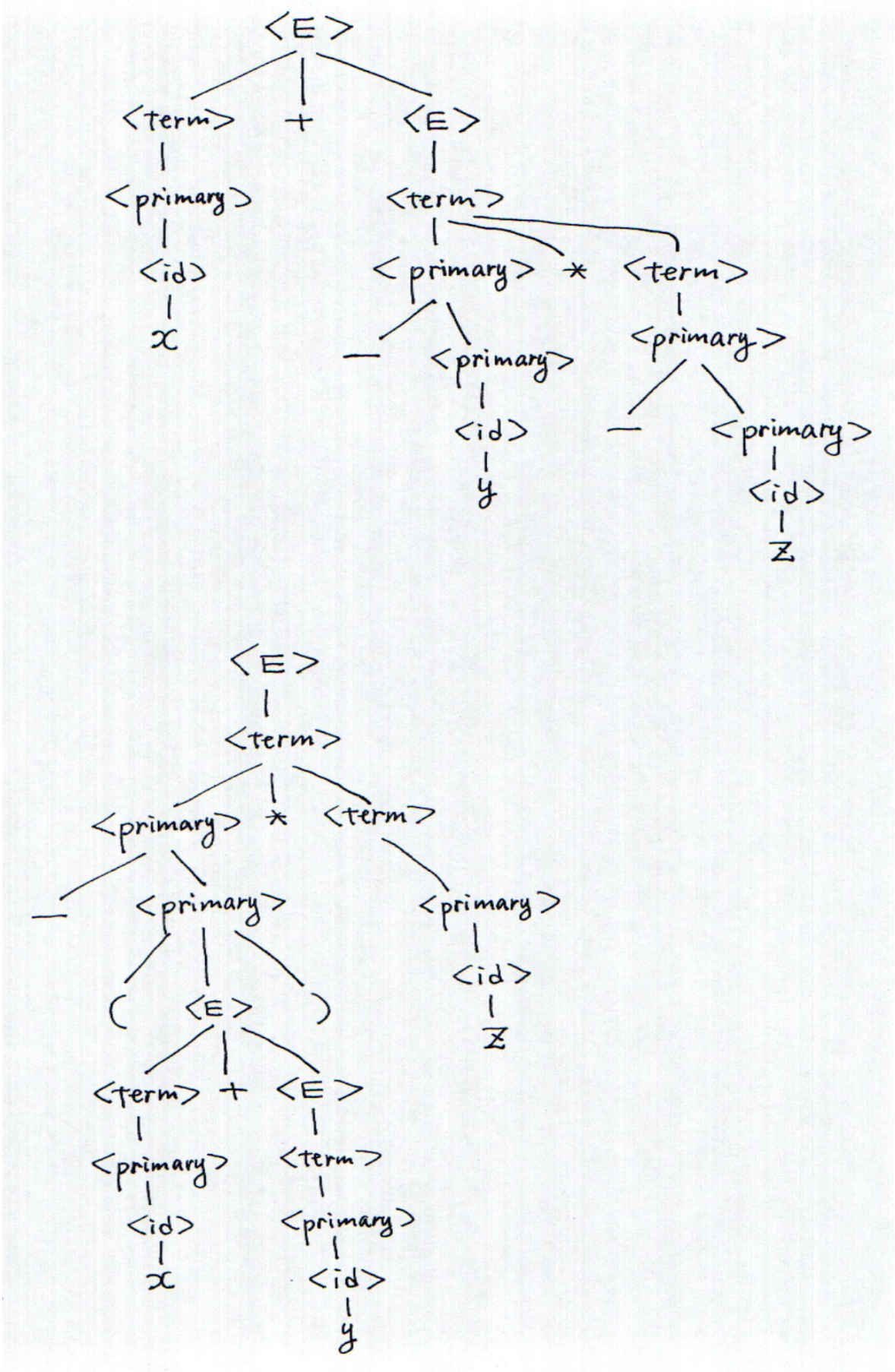
13.

abc valid, parse tree not shown
abc xyz + valid, parse tree not shown
abc xyz + ABC + valid, parse tree below
abc − xyz + invalid
abc abc xyz + − valid, parse tree below



14.

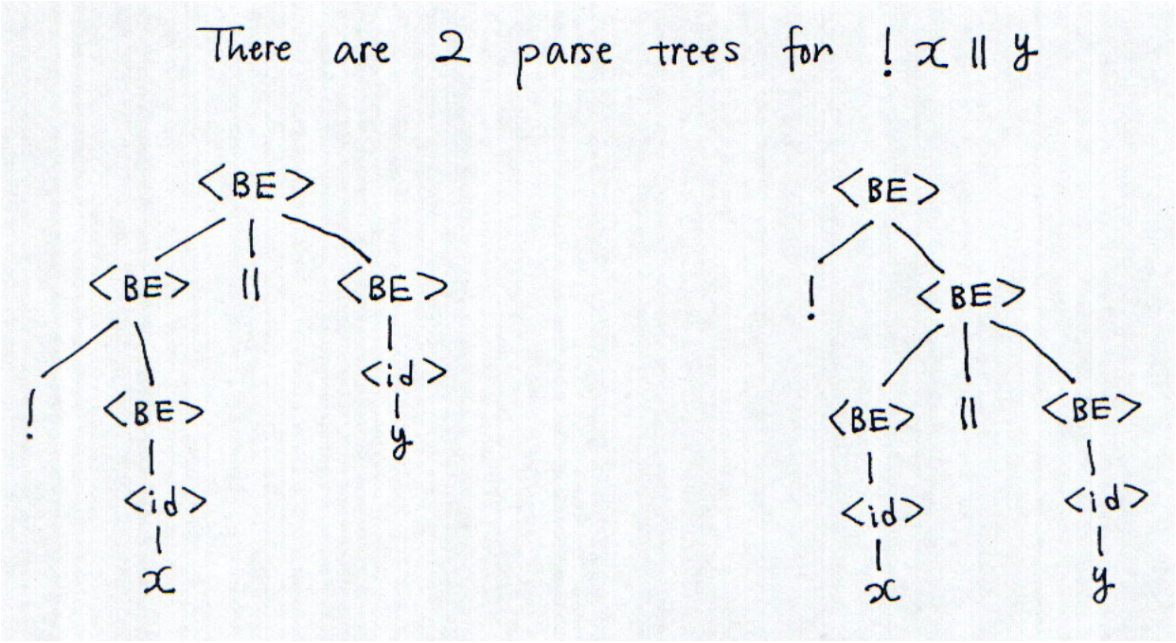
1. The parse trees for "x + − y * − z" and "− (x + y) * z" are shown.



2 & 3. Discussed in class.

15.

1.



2. There are 5 parse trees: one with "&&" at the root, two with the 1st "||" at the root, two with the 2nd "||" at the root.

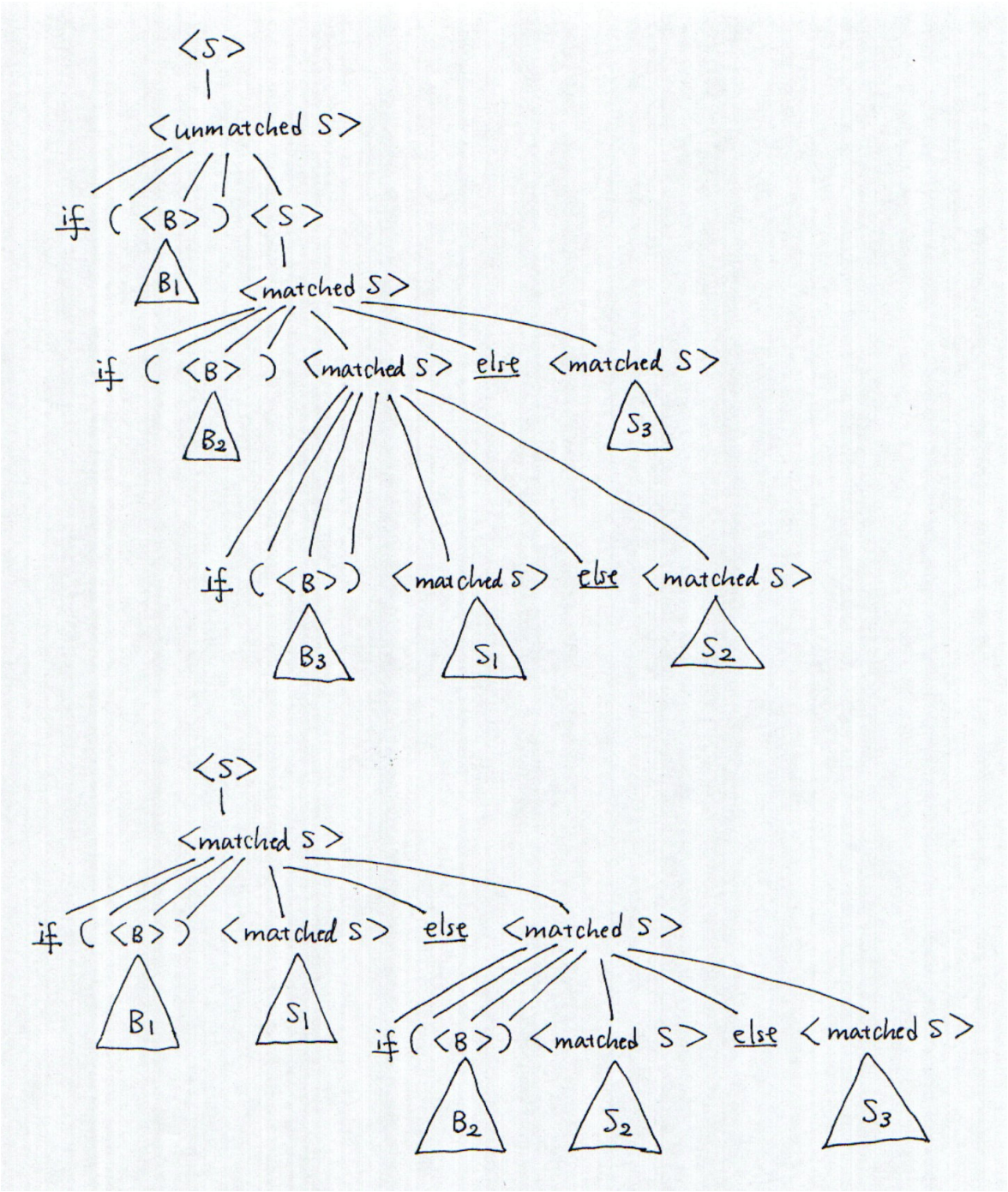
3. Both Q1 and Q2 show the existence of a string of terminals that has more than one parse tree.

4.

<BE> → <term> { "||" <term> }
<term> → <primary> { "&&" <primary> }
<primary> → <id> | "(" <BE> ")" | ! <primary>

16. Discussed in class.

17.



18. Answer can be found in your class notes or course notes.