First In-Class Exam

CMPSC 461: Programming Language Concepts (Spring 2018). Dr. Gang Tan

1.

(a) **False**, it can also be implemented by an interpreter.

(b) **False**. Most modern languages support multiple paradigms. For example, OCaml supports functional programming as well as object-oriented programming.

(c) **True**. If only one parse tree can be given, then there is no ambiguity.

(d) **False**. Anything that can be expressed in EBNF can also be expressed in BNF.

(e) **True**. Regular expressions are simpler than BNFs, and thus can be processed much faster.

(f) **True**. Any regular expression can be rewrite into a BNF grammar.

(g) **False**. Precedence determines which operators bind tighter than other operators.

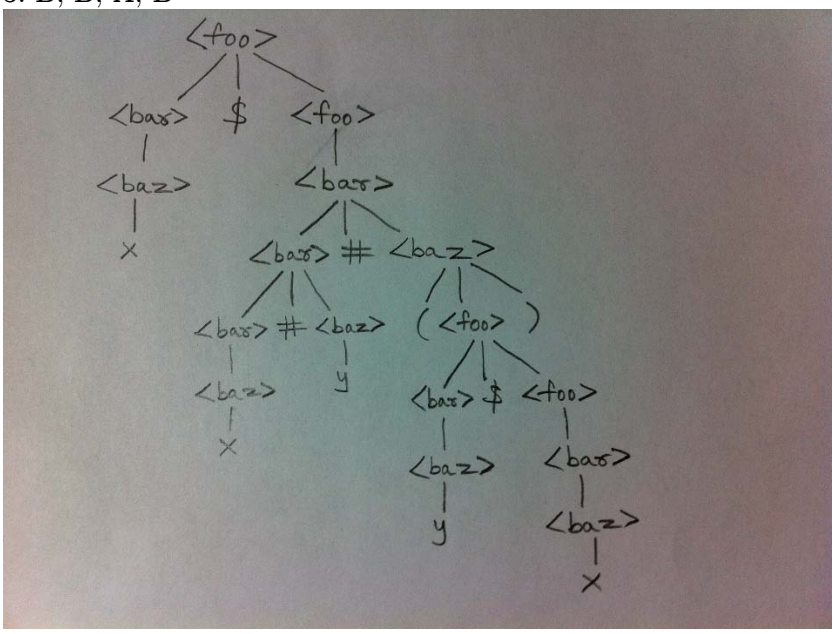
(h) **True**. Recursive descent parsing would lead to infinite loops on grammars with left recursion.

(i) **False**. Dynamic binding also called late binding.

(j) **False**. Function names are also tracked in the symbol table of a programming language implementation.

2. (1) A; B
(2) A
(3) B; A; B; C; E; D
(4) D

3. B; B; A; B



4.
<S> -> a<S>b | ab

5.

(a)
Main : A,2>, <B,2>

Sub1: <C, 4> <D, 4> <E, 4> <A, 2> <B, 2>

Sub2: <A, 9> <C, 9> <D, 9> <B, 2>

Sub3: <B, 11> <D, 11> <F, 11> <A, 9> <C, 9>

(b)

From Sub3: <B, 11> <D, 11> <F, 11>
From Sub2: <A, 9> <C, 9>
From Sub1: <E, 4>
From Main: None

(c)
From Sub1: <C, 4> <D, 4> <E, 4>
From Sub2: <A, 9>
From Main: <B, 2>

6.

(a)

<SNFloat>
-> <Float>E<Exponent>
-> <NonZeroDigit>E<Exponent>
-> 2E<Exponent>
-> 2E<Num>
-> 2E<Digit>
-> 2E<NonZeroDigit> -> 2E3

(b)

According the rule, there must be a number after ".", so 2.E3 cannot be derived from the grammar. 31.4 must be derived from <Float>, but <Float> can only derive one digit before ".", so 31.4 cannot be derived. As a result, 31.4E-1 cannot be derived from the grammar.

(c)
[1 - 9](.[0 - 9] +) ? (E (+ | -) ? [0 - 9] +) ?