

# Examination 1

CSC315 Programming Language Concepts

09 October 2015

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# Chapter 1

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### Kat Sayrs

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    - (a) Identify a language that requires the use of parentheses to enclose the index in a reference to an element of an array.
    - (b) Why did the designers of the language choose parentheses rather than brackets?
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- (a) Write your answer here.
  - (b) Write your answer here.

2. What is the relationship between a lexeme and a token?
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Write your answer here.

3.
    - (a) What kind of symbols are found at the internal nodes of a parse tree?
    - (b) What kind of symbols are found at the leaves of a parse tree?
- 

- (a) Write your answer here.
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4. One of the most significant contributions from the developers of ALGOL 60 also limited the success of that language. What was that contribution?

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Write your answer here.

5. What problem were the creators of Common LISP trying to solve?

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Write your answer here.

6. What is an ambiguous context free grammar?

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7. Contrast the complexity of algorithms that can parse strings that conform to the most general kinds of context free grammars and the complexity of the algorithms that can parse strings that conform to the grammars of programming languages?

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8. Java represents characters with Unicode. It is the first widely used programming language with this feature. What is the significance of this feature?

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9. How does the binary coded decimal type differ from the floating point type?

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10. Identify a user-defined ordinal type in the Java programming language.

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11. Mathematicians and programmers might have different ideas about the precedence of Boolean operators. Explain.

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12. Programmers should use `===` rather than `==` to test the equality of the values of two expressions in JavaScript. Why?

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13. Describe a hazard of allowing short-circuited evaluation of expressions and side effects in expressions at the same time.

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Write your answer here.

14. Briefly describe the three steps in the mark-sweep algorithm for garbage collection.

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15. What led Yukihiro Matsumoto to create the Ruby programming language?

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16. What did Microsoft aim to achieve with its development of the C# language?

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Write your answer here.

## Chapter 14

# Cameron Seebach

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## Chapter 15

### Joe Sterchele

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  - (a) Identify a language that requires the use of parentheses to enclose the index in a reference to an element of an array.
  - (b) Why did the designers of the language choose parentheses rather than brackets?

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- (a) Write your answer here.
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2. What is the relationship between a lexeme and a token?

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## Chapter 16

# Htut Khine Win

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    - (a) Identify a language that requires the use of parentheses to enclose the index in a reference to an element of an array.
    - (b) Why did the designers of the language choose parentheses rather than brackets?
- 

- (a) Ada
    - (b) The architects of Ada chose parentheses to enclose the index in a reference to an element of an array so that it is consistent between array references and function calls in expressions. Moreover, the choice is in part influenced by the notion that both array element references and function calls are mappings.
  2. What is the relationship between a lexeme and a token?
- 

A lexeme is the lowest-level syntactic unit in the programming languages. Lexemes are grouped and each lexeme group is represented by a token. Therefore, a token is a category of its lexemes. For example, an identifier is a token that can have lexemes.

3. (a) What kind of symbols are found at the internal nodes of a parse tree?

(b) What kind of symbols are found at the leaves of a parse tree?

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(a) Nonterminal symbols are found at the internal nodes of a parse tree.

(b) Terminal symbols are found at the leaves of a parse tree.

4. One of the most significant contributions from the developers of ALGOL 60 also limited the success of that language. What was that contribution?
- 

The revised method of syntax description called Backus-Naur Form, or BNF.

5. What problem were the creators of Common LISP trying to solve?
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LISP creators were trying to solve the lack of portability among programs written in various dialects.

6. What is an ambiguous context free grammar?
- 

A grammar that generates a sentential form for which there are two or more distinct parse trees is called ambiguous context free grammar.

7. Contrast the complexity of algorithms that can parse strings that conform to the most general kinds of context free grammars and the complexity of the algorithms that can parse strings that conform to the grammars of programming languages?
- 

Parsing algorithms that work for unambiguous grammar are complicated and inefficient. The complexity of such algorithms is  $O(n^3)$ . All algorithms used for the syntax analyzers that conform to the grammars of programming languages have complexity  $O(n)$ .



8. Java represents characters with Unicode. It is the first widely used programming language with this feature. What is the significance of this feature?
- 

Before Unicode, most commonly used coding was the 8-bit ASCII code. Unicode is a 16-bit character set. Unicode made huge impacts on the globalization of business and the need for computers to communicate with other computers around the world.

9. How does the binary coded decimal type differ from the floating point type?
- 

The float type is stored in four bytes of memory. Binary coded decimals are stored one digit per byte, in some cases, they are packed two digits per byte and it takes at least four bits to code a decimal digit.

10. Identify a user-defined ordinal type in the Java programming language.
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Enumeration types.

11. Mathematicians and programmers might have different ideas about the precedence of Boolean operators. Explain.
- 

In Mathematics, OR and AND operators have equal precedence. However, C-based languages assign higher precedence to AND than OR because programmers tend to associate multiplication with AND and addition with OR, which would naturally assign higher precedence to AND.

12. Programmers should use `===` rather than `==` to test the equality of the values of two expressions in JavaScript. Why?
- 

Because `==` forces the operand to match the type. Yet, `===` does not coerce the operands of this operator.

13. Describe a hazard of allowing short-circuited evaluation of expressions and side effects in expressions at the same time.

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Suppose that short-circuit evaluation is used on an expression and part of the expression that contains a side effect is not evaluated; then the side effect will occur only in complete evaluations of the whole expression. If the program correctness depends on the side effect, short-circuit evaluation can cause serious problems.

14. Briefly describe the three steps in the mark-sweep algorithm for garbage collection.

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First, all cells in the heap have their indicators set to indicate they are garbage. In the second part, every pointer in the program is traced into the heap and all reachable cells are marked as not being garbage. In the third part, all cells in the heap that have not been specifically marked as still being used are returned to the list of available spaces.

15. What led Yukihiro Matsumoto to create the Ruby programming language?

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Because he was dissatisfied with the design of Perl and Python, although both of them support object-oriented language, neither is a pure object-oriented language, at least in the sense that each has primitive(nonobject) types and each supports functions.

16. What did Microsoft aim to achieve with its development of the C# language?

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The purpose of C# is to provide a language for component-based software development, specifically for .NET framework.