CS 4700 - Exam #1 - 100 points

Multiple Choice (2 points each) Circle the single best answer.

1. In specifying the font for a printed String in some language, some sizes are not allowed in some fonts. This is a violation of which principle?
   a. reliability
   b. orthogonality
   c. static typing
   d. readability

2. Which language is called the language to end all languages because it is so general?
   a. Ruby
   b. Cobol
   c. Lisp
   d. PL/1

3. A hybrid implementation is used to describe an implementation which mixes the following:
   a. compilation/interpretation
   b. functional/logical
   c. imperative/object oriented
   d. efficiency/reliability

4. In a program you try to compile, if you mistype the reserved word “while” as “whi le”, when would be recognized as an error?
   a. At lexical analysis
   b. At parsing
   c. At code generation
   d. At load time

5. What is the defining feature which describes early assembly languages?
   a. similarity to underlying architecture
   b. effectively support the application domain of interest
   c. supports software engineering technology
   d. definition is independent of any particular hardware or operating system

6. What is the main reason that the languages PL/I, ALGOL68, and ADA had limited popularity and were not widely adopted programmers?
   a. reasons were all different
   b. too large
   c. poor marketing
   d. too different from accepted structure

7. What is the best description of languages denoted by the following regular expression
   0 ( 0 | 1 ) * 0
   a. strings of zeros and ones with zeros occurring more frequently that ones
b. strings from alphabet \{0,1\} which begin and end with a zero

c. strings from alphabet \{0,1\} which begin and end with a zero and have an even number of zeroes

d. strings from alphabet \{0,1\} which begin with one or more zeros, followed by zero or more ones, followed by a zero.

8. What is the best description of the languages denoted by the following regular expressions

\(( ( 11 \mid 0 ) \ast ) \ast\)

a. strings from the alphabet \{0,1\} in which there are an even number of 1s

b. strings from the alphabet \{0,1\} in which ones always appear in pairs

c. strings from the alphabet \{0,1\} in which ones occur twice as frequently as zeros

a. strings from the alphabet \{0,1\} in which there are an even number of 1s and an odd number of zeroes.

9. Describe the languages denoted by the following regular expressions \(0\ast 1 0\ast 1 0\ast 1 0\ast\)

a. strings from the alphabet \{0,1\} in which there are an odd number of 1s

b. strings from the alphabet \{0,1\} in which ones never appear together

c. strings from the alphabet \{0,1\} in which there are exactly three ones.

d. strings from the alphabet \{0,1\} in which there are exactly three ones or no ones

10. Identify the regular expression which defines all strings from the alphabet \{a-z\} that contains the five vowels in alphabetical order (but not necessarily adjacent) aeiaabradgge and eaeiou are okay but baiodcdeuaabbdde is not

a. \(a\ast[a-z] e\ast[a-z] i\ast[a-z] o\ast[a-z] u\ast[a-z]\)

b. \((a[a-z]+ e[a-z]+i[a-z]+o[a-z]+u+[a-z]+)+\)

c. \((a+[a-z]\ast e+[a-z]\ast i+[a-z]\ast o+[a-z]\ast u+[a-z])\ast\)

d. None of the above

11. Identify the regular expression which matches all strings of 0’s and 1’s that do not contain the substring 011

a.\((^[011]*1\ast)\ast\)

b. \((0\ast1)+0\ast1\ast0\ast\)

c. \((01\mid010\mid100\mid110)\ast\)

d. \((0+1)*0\ast1\ast0\ast\)

e. None of the above

12. What famous language was invented by Bjarne Stroustrup?

a. Ruby

b. Prolog

c. Cobol

d. Fortran

e. C++
13. Name the associate of Charles Babbage who is considered to be the first programmer:
   a. Yukihiro Matsumoto
   b. Bjarne Stroustrup
   c. Ada Lovelace
   d. Grace Hopper
   e. John Backus

14. In lexical analysis, the token is the term used for the category of a matched string. What is the name for the actual string matched?
   a. lexer
   b. regular expression
   c. pattern
   d. lexeme
   e. alphabet

15. In a program you write (in Ruby), if you mistype the variable “sum” as “sun” in as assignment statement "sun = 0", when would this error be recognized?
   a. At lexical analysis
   b. At parsing
   c. At execution time when you tried to use sum
   d. Never, that's the problem with not requiring declarations

16. In a language, if similar things look different, we say it has violated what language design principle:
   a. generality
   b. specificity
   c. orthogonality
   d. uniformity
   e. preciseness

17. Which of the following is an example of lack of orthogonality?
   a. A variable number of parameters is allowed but the proper use can't be statically checked
   b. Arrays are passed by reference while integers are passed by value.
   c. I/O is not standardized.
   d. Assigning to dangling pointers (pointers that don't point to anything) is illegal, but cannot be checked at compile time.

18. In Ruby, what syntax allows a method to deal with a variable number of arguments?
   a. a variable number of parameters is illegal
   b. An array must be passed
   c. def method_name(var1...varn)
   d. def putter(*args)
   e. None of the above
19. What is the primary justification for dynamic binding in a language such as C++?
   a. Otherwise couldn't have polymorphism
   b. Otherwise couldn't get strong type checking
   c. Otherwise you couldn't have the same variable in different scopes
   d. C++ has no dynamic binding

20. When a block is passed to a method in Ruby, explain the scope of any variables referenced in the block.
   a. All used variables must be declared in the passed block
   b. All used variables are determined using the scope of the called method
   c. All used variables are determined using the scope of the calling method
   d. The scope is statically determined based on lexical structure

21. What is the key reason that interpreted programs run more slowly than compiled programs?
   a. the interpreter must analyze each statement each time it is executed
   b. optimizations must be done at run time
   c. the language is more sophisticated
   d. interpreted languages use double the amount of memory to store the data
   e. code can't be targeted to run well on a specific architecture

22. What is true concerning the difference between shallow and deep copy?
   a. a shallow copy clones the data
   b. a deep copy copies addresses rather than data
   c. a deep copy initially copies addresses but switches to copying data
   d. changing a shallow copy changes the original

23. Taking advantage of << to add to an array, consider the code
    ```ruby
    def foo(bar)
      if block_given?
        yield bar
      end
    end
    result=[]
    (1..10).each{|i| foo(i){|x| result<<x}}
    p result
    ```
    The results are
    a. [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
    b. undefined local variable or method 'i' for main
    c. undefined local variable or method 'result' for foo
    d. nothing is printed.
24. A blogger comments about Ruby: why can’t variables end with question marks? There is no good reason to only allow question marks on functions as trailing question marks for boolean variable names would definitely be quite useful too. Which is the best response?
   a. I see your point, but since variables have no type, it would be inconsistent to have a trailing question mark indicate type.
   b. It makes no sense to expect a variable to act like a method name
   c. Methods also allow ! as a trailing mark and that would have no variable counterpart.
   d. Variables can end with a ?, they just aren't forced to be Boolean.

**Short Answer**

1. (8 points) Algol was an important language that never received widespread acceptance. Give two reason why it was important and two reasons why was it never accepted widely?
   **Important**
   (1) 
   (2) 
   **Never Widely Adopted**
   (1) 
   (2) 

2. (8 points) Most large programs that have been written with considerable care and thoroughly checked still seem to contain bugs at a rate of over one per 3000 lines of source code. Systems involving hundreds of millions of lines of code can thus be expected to contain tens of thousands of potentially catastrophic errors. List several kinds of programming errors affected by language that can appear in programs and discuss their relative importance in relation to the long-term reliability of a large application program. How could such problems be reduced by changes to the language itself? Be specific.
3. (5 points) It has been said that “you can only become a really effective user of a programming language if you have a good understanding of how all its features are implemented”. Use Ruby features such as Hashing or Arrays as examples to discuss to what extent this is true.

4. (6 points) Give a regular expression for the set of all strings over \{1, 0\} each string contains exactly one 1 and an even number of 0s.
Examples: 1, 001, 010, 00001, 00010, 00100, 01000, 10000, and so on

5. (5 points) Recall a Ruby Symbol begins with a colon (such as :Name or :Transportation). What is the purpose of using symbols in Ruby?
6. (8 points) A blogger comments about Ruby: Functions don’t have to explicitly return anything. If a function does not end with a return statement, the return value of the last statement in that function will be returned instead. There are two things I don’t like about this. First of all, in some cases you have to explicitly return anyway, so why not always make return explicit, instead of only sometimes? Secondly, a function can secretly return something even if you didn’t intend it to return anything.

Using your knowledge of good language features (uniformity, preciseness, reliability, readability, encapsulation), defend or reject his statements.

7. (12 points) Write the Ruby code to read in a file of text and print out the word which occurs most frequently in the file. Include comments to explain what you are doing.

So, for the file:

To change this template, choose Tools | Templates and open the template in the editor. change CHANGE change; open OPen OPEN Change Change.change open OPEN

Output:
Word change occurs 7