Name:	_____	CS Username:	_____
Grade:	_____	Blackboard Username:	_____

- Be sure to begin by printing your *name* and both *usernames* clearly in the spaces provided above.
- If you find a question ambigous: write the most reasonable assumptions you can think of near the question, and then answer the question under these assumptions.
- The exam is graded as 100 percentage points. The points available for individual questions are shown in parentheses. There are 17 numbered questions on 4 pages.

1. What kind of programming construct is the following Pascal construct? (mark **one**) (5 points)

```
for n=1 to 20 do
  ...
```

   (a) a sequencing statement
   (b) a selection statement
   (c) an enumeration-controlled loop
   (d) a logically-controlled loop

2. What is short-circuit evaluation of Boolean expressions? (5 points)

   (a) it means that these expressions are evaluated at compile time
   (b) it means that the evaluation of an operand can be skipped when the logical result can be determined from the evaluation of another operand
   (c) it means that if both operands of an operator are the same, then only one needs to be evaluated
   (d) it means that the logical result of a Boolean operator always evaluates to the same value

3. What does the `throws` keyword do in Java? (mark **one**) (5 points)

   (a) it raises an exception
   (b) it defines a list of exceptions that a method can raise
   (c) it removes and throws away an object
   (d) it catches an exception in an exception handler

4. Give examples of two different *selection statement* constructs in C, C++, or Java. (10 points)

5. Give an example of a *tail-recursive* function in C. (5 points)

6. Re-write your example to eliminate tail-recursion using a loop. (5 points)

7. What is the value printed by the following pseudo-code program for each of the parameter passing modes shown in the table? (10 points)

```
procedure p(integer x)
begin
  x := x + 1;
end

begin // main program
  integer a;
  a := 2;
  p(a);
  print(a);
end
```

	By value	By reference
Output:		

8. What kind of programming construct is the following C statement? (mark **one**) (5 points)

```
switch (val) { case N: ... case M: ... }
```

   (a) a sequencing statement
   (b) a selection statement
   (c) an iteration statement
   (d) a nondeterministic statement

9. The name of the notation used for Scheme's operators and function calls is ... (mark **one**) (5 points)

   (a) prefix notation
   (b) postfix notation
   (c) infix notation
   (d) Cambridge Polish notation

10. Mark the entries in the table indicating which parameter passing modes pass parameters in and/or out (**check** those that apply) (5 points)

Passing Mode	In	Out
Value		
Reference		
Sharing		
Value/Result		
Name		

11. Consider the following C construct:

```
for (i = 0; i < 100; ++i)
{ ... }
```

    What sort of programming construct is this? (mark **one**) (5 points)

   (a) an enumeration controlled loop
   (b) a logically controlled pre-test loop
   (c) a logically controlled post-test loop
   (d) a logically controlled mid-test loop

12. Name the seven major categories of control-flow ordering constructs. Indicate which of these are implemented in C/C++ [C] and Java [J]. (10 points)

13. *Non-structured* control flow means that ... (mark **one**) (5 points)

    (a) ... C `structs` are not used in a program

    (b) ... proper indentation is not used

    (c) ... `gotos` are used

    (d) ... concurrency is not used

14. Which of the four sentences below is *false*? (mark **one or <u>more</u>**) (5 points)

    (a) logically controlled *pretest loops* check loop conditions before each iteration

    (b) in C++ the binding time of a variable to its type declaration is at run time

    (c) an *l-value* is a logical value

    (d) in a *statically scoped language* the exact storage location of a variable can always be determined at compile time

15. Suppose a programming language uses garbage collection. What kind of (de)allocation problems do *not* occur? (mark **one or <u>more</u>**) (5 points)

    (a) memory leaks

    (b) internal and external heap fragmentation

    (c) dangling references

    (d) dereferencing uninitialized pointers

16. What is the value of the following Scheme expression? (5 points)

```
(cons 0 (member 3 '(1 2 3 4)))
```

17. What is the value of the following Scheme expression? (5 points)

```
((lambda (x) (/ (* x (+ x 1)) 2)) 5)
```