The University of Alabama in Huntsville
Electrical and Computer Engineering
CPE 112 01
Test #4
November 20, 2002

True or False (2 points each) Name: _____

1. _____ Using global variables is better style than using local variables.

2. _____ The statement
```
return 3 * alpha + 8;
```
is valid in a value-returning function but not in a `void` function.

3. _____ If a programmer has developed a large portion of a complete project and wants to test the developed portion before implementing the remaining functions, this programmer is more likely to need function drivers than function stubs.

4. _____ Because of representational error, two integers should not be compared for exact equality.

5. _____ In the data type defined by
```
enum Colors {RED, GREEN, BLUE};
```
the enumerators are ordered such that `RED` > `GREEN` > `BLUE`.

6. _____ C++ allows a struct to be a member of another struct.

7. _____ In C++, a struct can be passed as a parameter either by value or by reference.

8. _____ C++ does not allow aggregate operations on structs.

Multiple Choice (2 points each)

9. _____ If a variable `alpha` is accessible only within function `F`, then `alpha` is either
   a. a global variable or a parameter of `F`.
   b. a local variable within `F` or a parameter of `F`.
   c. a global variable or an argument to `F`.
   d. a local variable within `F` or an argument to `F`.

10. _____ Given the function definition
```
int Mystery( /* in */ float someVal )
{
    if (someVal > 2.0)
        return 3 * int(someVal);

      else
        return 0;
}
```
what is the value of the expression `Mystery(4.2)` ?
   a. 12
   b. 12.0
   c. 0
   d. 0.0
   e. nothing--the function call is invalid

11. ____ A struct is an example of:
   a. a simple data type
   b. a homogeneous structured type
   c. a heterogeneous structured type
   d. an enumeration type

12. ____ Given the function prototype

```
int Top( int, int );
```

which of the following statements contain valid calls to the `Top` function?

a. `someInt = 4 + Top(oneInt, anotherInt);`

b. `cin >> Top(oneInt, anotherInt);`

c. `cout << Top(5, Top(3, 4));`

d. a and c above

e. a, b, and c above

13. _____ What is the appropriate function prototype for a function that receives a character letter grade and returns its integer equivalent on a four-point grading scale?

a. `void IntEquiv( char );`

b. `void IntEquiv( int );`

c. `int IntEquiv( char );`

d. `int IntEquiv( char& );`

e. `char IntEquiv( int );`

14. ____ Assume you have the following declarations:

```
enum Days {SUN, MON, TUE, WED, THU, FRI, SAT};
Days someDay;
Days twoBefore;
```

and that `someDay` has been assigned some value. The variable `twoBefore` is to represent the day of the week that is two days before `someDay`. Which of the following stores the proper value into `twoBefore`?

a.
```
twoBefore = someDay - 2;
```

b.
```
twoBefore = Days(someDay - 2);
```

c.
```
if (someDay < TUE)
    twoBefore = SAT;
else
twoBefore = someDay - 2;
```

d.
```
switch (someDay)
{
    case SUN : twoBefore = FRI;
               break;
    case MON : twoBefore = SAT;
               break;
    default  : twoBefore = Days(someDay - 2);
}
```

e. none of the above

15. ____ Which of the following is a valid use of the C++ cast operation?

a. `beta = short(alpha);`

b. `beta = (long double) alpha;`

c. `beta = long double(alpha);`

d. a and b above

16. ____ You are writing a program that will add three floating point variables `x`, `y`, and `z`. Their likely value ranges are as follows:

`x`: 0.01 to 0.9

`y`: 2.1E10 to 3.0E10

`z`: -3.5E10 to -2.2E10

In which order should you add them to obtain the most accurate answer?

a. Add `x` and `y`, then add `z`.

b. Add `z` and `x`, then add `y`.

c. Add `y` and `z`, then add `x`.

17. ____ Given the declaration

```
struct PersonRec
{
  int   age;
  float height;
  int   weight;
};
```

which of the following is valid for creating and initializing a PersonRec variable?

a. PersonRec me;
   me.age = 19;
   me.height = 66.5;
   me.weight = 140;

b. PersonRec me = {19, 66.5, 140};

c. PersonRec.age = 19;
   PersonRec.height = 66.5;
   PersonRec.weight = 140;

d. a and b above

e. a, b, and c above

18. ____ Given the declarations

```
typedef char String19[20];
struct BrandInfo
{
   String19 company;
   String19 model;
};
struct DiskType
{
   BrandInfo brand;
   float     capacity;
};
DiskType myDisk;
```

what is the type of myDisk.brand?

a.char

b. DiskType

c.St ring19

d. BrandInfo

e.none of the above

Fill in the Blank (2 points each)

19. A(n) _____ is a simple `main` function that is used to call a function being tested.

20. The _____ of an identifier is the region of program code where it is legal to reference that identifier.

21. An If statement is an example of a(n) _____ control structure.

22. _____ is the condition that occurs when the result of a calculation is too large to be represented in memory.

23. _____ is the conversion of a value from a "lower" type to a "higher" type according to a programming language's precedence of data types.

24. An If statement is an example of a(n) _____ control structure.

25. Given the declarations

```
enum WoodKind {HARDWOOD, SOFTWOOD};
struct Size
{
  int length;
  int width;
  int thickness;
};
 struct Wood
{
  Size     dimensions;
  WoodKind kind;
  int      smoothSurfaces;
};
Wood oneBoard;
```

write a statement to print the width of `oneBoard`: _____

26. (16 points) a. (4 points) Declare an enumeration type for the undergraduate engineering degrees given at UAH, using the appropriate abbreviation for chemical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical and aerospace engineering, and optical engineering. b. (8 points) Write a value-returning function that converts the first two letters of the abbreviation into the type declared in (a). c. (4 points) Give the necessary declarations and make a call to the function you wrote in part (b).

27. (12 points) What is the output of the following C++ program?

```
#include <iostream>
using namespace std;

void Do Global();
void DoLocal();
void DoReference(int&);
void DoValue(int);

int x;

int main()
{
   x = 15;
   DoReference(x);
   cout << Òx = Ò << x << Ò after the call to DoReference.Ó << endl;
   x = 16;
   DoValue(x);
   cout << Òx = Ò << x << Ò after the call to DoValue.Ó << endl;
   x = 17;
   DoLocal(x);
   cout << Òx = Ò << x << Ò after the call to DoLocal.Ó << endl;
   x = 18;
   DoGlobal(x);
   cout << Òx = Ò << x << Ò after the call to DoGlobal.Ó << endl;
   return 0;
}
void DoReference (int& a)
{
   a = 3;
}
void DoValue (int b)
{
   b = 4;
}
void DoLocal()
{
   int x;
   x = 5;
}
void DoGlobal ()
{
   x = 7;
}
```

28. (10 points) Given the declarations:

```
struct NameType
{
   string first;
   string last;
};
struct AddrType
{
   string city;
   string state;
   long zipCode;
};
struct PersonType
{
   NameType name;
   AddrType address;
};
PersonType person;
```

write C++ code that store the following information into `person`:

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29. (12 points) Write a value-returning function that accepts one `int` parameter, `num`, and returns the value of `num + num-1 + num-2 ... + 2 + 1`. If `num` is negative, return –1. Use a `for` loop in your solution.