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Name _________________________________

Exam #2
CPE 112 Section 01
July 21, 2005
90 Minute time limit –150 points

Closed notes, book and neighbor.  **If you have any questions ask them.**

Notes:

- **Segment of code** – necessary C++ statements to perform the action described – not a complete program
- **Program** – a complete C++ program – what you have been writing in lab.

Write clearly and make sure the case of a letter is clear (where applicable) since C++ is case sensitive.

**Unless otherwise noted, assume a single space between all words.**

For this test the two-character sequence `\n` is to be taken to mean the newline character.

**There are no INTENTIONAL syntax errors. Assume that all code in this exam will compile.**
**There may be logic errors in some of the code.**

1) **(2 pts)** A function that returns a function value is known as what kind of function?
   
   A) Value returning  
   B) Reference Parameter  
   C) Empty  
   D) Void  
   E) Expression less  
   F) None of these

2) **(2 pts)** How many **function values** does a value returning function have?
   
   A) 1  
   B) 2  
   C) As many as necessary  
   D) 3  
   E) 4  
   F) None of these

3) **(2 pts)** Which of the following can be used as a **switch expression**? (Circle all correct answers):
   
   a) bool variable  
   b) string constant  
   c) char variable  
   d) integer variable  
   e) floating point variable  
   f) None of Them

4) **(2 pts)** Circle all of the following that are examples of event-controlled loops:
   
   A) Previous Value  
   B) Sentinel-Controlled  
   C) Count-Controlled  
   D) Flag-Controlled  
   E) End-Of-File Controlled  
   F) All of these
5) (2 pts) Which of the following operations ARE ALLOWABLE aggregate operations on structures.

- a) Return as a functions return value
- b) Assignment
- c) Arithmetic
- d) Input/Output (cin, cout statements)
- e) Comparison
- f) Argument pass by value to a function
- g) Argument pass by reference to a function
- h) None of these

6) (2 pts) Value parameters (passing by value) are used if a parameters data flow is

- A) one-way, into the function
- B) one-way, out of the function
- C) two-way, into and out of the function
- D) A and B
- E) B and C
- F) None of these

7) (2 pts) Reference parameters (passing by reference) are used if a parameters data flow is

- A) one-way, into the function
- B) one-way, out of the function
- C) two-way, into and out of the function
- D) A and B
- E) B and C
- F) None of these

8) (3 pts) What are the three logical operators for C++?

_____________________  _______________________  ______________________

9) (6 pts) For the operators shown below, CLEARLY indicate if the operator is Relational (use an R),
Logical (use an L) or Neither (use an N). NOTE: that there are no spaces between characters even though it
may appear that there is a blank in some of the operators

- a) ||
- b) <<
- c) ==
- d) <=
- e) !=
- f) =
- g) !
- h) >=
- i) >>
- j) >=
- k) & &
10) (5 pts) Which of the following **best describes** the loop control for the loops indicated below:

A) Count-Controlled     B) Flag-controlled     C) Sentinel controlled
D) End-of-file controlled     E) None of these

a) while (Input_file) ______

b) while (count <10) ______

c) for(int loop = 0;loop<20;loop++) ______

d) while(!positive) ______

e) do{body of do while }while (test != -1); ______

11) (4 pts) Write the **type declaration** for a **struct** DataType named **LogType** containing the following members:

- an integer variable representing the log entry number
- a string variable representing the name of the person making the log entry
- a floating-point variable indicating the cost of the entry
- A **Date variable** indicating the day of the entry where **Date** is a structure already defined
12) (8 pts) Match the words with their definitions. **Choose the BEST definition for each word.**

a) Function Prototype ______  
   e) Structure _____  

b) Scope ______  
   f) Function Call _____  

c) Aggregate Operation _____  
   g) Hierarchical Structure _____  

d) Name Precedence _____  
   h) Argument __  

A) Definition is not listed below (may be used more than once)  
B) A structured collection of components, all of the same DataType that is given a single name  
C) A structure in which at least one of the members is itself a structure  
D) A function declaration that includes the body of the function  
E) The region of a program where it is legal to reference (use) an identifier.  
F) A function declaration without the body of the function  
G) A statement that transfers control to a function.  
H) a variable or expression listed in a call to a function  
I) The precedence that a local identifier in a function has over a global identifier with the same name  
J) An operation on a data structure as a whole, as opposed to an operation on an individual component of the data structure

13) (8 pts) Match the words with their definitions. **Choose the BEST definition for each word**

a) Loop _____  
   e) Static Variable _____  

b) Reference Parameter _____  
   f) Member Selector _____  

c) Switch Expression _____  
   g) Value Parameter _____  

d) Local Variable _____  
   h) Lifetime _____  

A) Definition is not listed below (may be used more than once)  
B) Computes a new value by performing a specified set of operations on given values.  
C) A parameter that receives a copy of the value of the corresponding argument  
D) The expression whose value determines which switch label is selected.  
E) A variable for which memory remains allocated throughout the execution of the entire program  
F) A component of a structure.  
G) The expression used to access components of a struct variable.  
H) The order in which the computer executes the statements in a program  
I) A control structure that causes a statement or group of statements to be executed repeatedly.  
J) A variable declared within a block and not accessible outside of that block
14) (18 pts) True/False questions. Select T for true and F for false.

T  F  a) Value parameters receive the memory location of an argument.

T  F  b) Reference parameters receive the memory location of an argument.

T  F  c) Local identifiers have name precedence over global identifiers.

T  F  d) The use of the statement: `return;` is NOT valid in a void function.

T  F  e) Members of a structure must be of the same DataType.

T  F  f) Static variables in a function are deleted when the function finishes execution.

T  F  g) The body of a `for` loop executes at least once.

T  F  h) When a `break` statement is executed, the innermost loop in which it appears is exited.

T  F  i) A `switch` statement MUST have a `default switch label`.

T  F  j) A function call can contain more arguments than the number of parameters in the corresponding function heading.

T  F  k) A logical expression can consist of a single Boolean variable?

T  F  l) An argument corresponding to a reference parameter cannot be a constant or arbitrary expression?

T  F  m) The body of a do-while loop executes zero or more times

T  F  n) A compile error results when the DataType defining a function type is omitted.

T  F  o) The statement `for(;;);` is a valid C++ statement.

T  F  p) A `switch` statement can have more than 1 `default label`.

T  F  q) All possible values for the `switch expression` must be included among the `case labels` for a given `switch` statement.

T  F  r) A variable declared as a union can hold more than one value at any given time?
15) (10 pts) Consider the following structure declarations when answering the questions below.

```c
struct Date
{
    int day;
    int month;
    int year;
};
struct Person
{
    string name;
    string city;
    int age;
    Date dob; // dob = date of birth
};
```

a) Write a statement that declares the identifier `birthday` as a variable of DataType `Date`.

b) Write a `cout` statement that will output the value of the `day` member of `birthday`.

c) Write a statement that declares the identifier `Ron` as a variable of DataType `Person`.

d) Write a statement that assigns a value of “Huntsville” to the `city` member of `Ron`.

e) Write a statement that assigns a value of 2005 to the `year` member of `dob`, which is a member of `Ron`.

16) (4 pts) In the following code segment, all variables are integers.

```c
maxHeight = 50;
maxWeight = 30;
if (height > maxHeight)
    if (weight <= maxWeight)
        cout << "Message #1\n";
    else
        cout << "Message #2\n";
else
    if (weight > maxWeight)
        cout << "Message #3\n";
    else
        cout << "Message #4\n";
```

What is the output of this segment of code if the variables have the following values when it is executed? `height = 50`, `weight = 40`
17) (6 pts)

a) What is the output for the code segment below:

```cpp
int count = 0;
bool finished = false;
while (!finished)
{
    count++ ;
    if (count > 5)
        finished = true;
    else
        finished = false;
}
// This is the only line that outputs information
cout << "count is: " << count << endl;

`count is: __________`
```

b) If necessary, rewrite the code segment in part a (by correcting any possible logic errors) so that the value printed out is 6. You can modify lines that are present only – do not delete or add any more lines to the code segment. If no modifications are required, write “No modifications required”. A partial copy of the code has been provided to reduce the amount of writing necessary.

```cpp
int count
bool finished

while
{
    count++;
    if
        finished
    else
        finished
}
// This is the only line that outputs information
cout << "count is: " << count << endl;
```

18) (8 pts) Consider the code segment shown when answering the questions below:

```cpp
int number;
cout << "Enter an integer between 1 and 6: ";
cin >> number;
switch(number)
{
    case 6: cout << 'A';
    case 1: cout << 'B';
    case 4: cout << 'C';
    case 3: cout << 'X';
    case 2: cout << 'Y';
    case 5: cout << 'Z';
    default: cout << "default" << endl;
}
```

a) What is the output if 8 is entered?

b) what is the output if 6 is entered?
19) (8 pts) What is the output of the following program:
For the following code segment, write out what is printed to the screen.
Place a **single character in each box**, skip a box to indicate a space, and skip a row to indicate a blank line.

```cpp
#include <iostream>
using namespace std;
void Test();
int main()
{
    Test();
    Test();
    Test();
    return 0;
}
void Test()
{
    int i = 0;
    static int j = 0;
    i++;
    j++;
    cout << i << "—" << j << endl;
}
```
20) (8 pts) The int variable change is used as the switch expression in a switch statement. Write a code segment using a switch statement that prints the information below

   “Penny” if change has a value of 1,
   “Nickel” if change has a value of 5,
   “Dime” if change has a value of 10, and
   “Error” if change is not 1, 5 or 10.

Note: The switch statement is to output one line only.

21) (4 pts) Consider the following segment of code

```cpp
int count = 0;
int sum = 0;
while (count < 5)
{
    count++;
    sum += sum;
    cout << sum << endl;
}
```

Rewrite the above code segment as a for loop such that the same output is obtained.
22) (10 pts) Finish the program below by adding a void function as specified below. **Add only a function prototype, function call statement and function definition** to the following program. No other information is to be added (i.e. variables)

The name of the void function is **InitStruct**. The function has one parameter of the struct DataType **Date**. The function is to initialize each member of the structure with a value of 0. The information stored in the structure **must be available in main()** after the function call.

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

struct Date
{
    int month;
    int day;
    int year;
};
// Place the function prototype below this line

int main()
{
    Date date;
    // Place the function call statement below this line

    return 0;
} // Place the function definition below this line
```
23) (6 pts) Rewrite the void function definition below as a value returning function definition such that the caller of the function still has access to the value that is being returned by the void function.
   - Do not use any reference parameters with the value returning function.
   - Two value parameters only are allowed for use with the value returning function.
   - You can add a single variable declaration if necessary.

```c
void Calculate (float& result, float num1, float num2)
{
    result = (num1 + num2)*5;
}
```

24) (10 pts) Write a Boolean value-returning function definition called OpenFile with 2 parameters.

- The function prompts the user for the name of the file to open (use .c_str()) and opens the file.
- The function returns a value of true if the file was successfully open.
- A value of false is returned if the file was not successfully opened.

- The first parameter contains the name of the file that is entered for opening. The name of the file entered must be available for use in main().
- The second parameter, an ifstream variable, represents the input stream to use.
25) (10 pts) When the program shown below is executed, what is the output to the screen? This problem deals with the scope of a variable in a program, and the order of execution of statements. There will be a total of 4 lines written to the screen from this program. **Analysis of this program requires some thought.**

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

void function_A(int&);
void function_B(int&);
int number = 4;
int main()
{
  int number = 3;
  function_B(number);
  cout << "number in main is: " << number << endl;
  return 0;
}
void function_A(int& num)
{
  int number = 2;
  cout << "number in function A is: " << number << endl;
  num = num +2;
}
void function_B(int& sum)
{
  cout << "sum in function B is: " << sum << endl;
  cout << "number in function B is: " << number << endl;
  sum = sum + 1;
  function_A(sum);
}

The output for this program is as indicated below. In the blank to the left of the lines, place 1,2,3 or 4 to indicate the order the statements are printed (1 for first, 4 for last). In The blank at the end of the line, put in the output value.

___ number in main is: __
___ number in function A is: ___
___ sum in function B is: ___
___ number in function B is: ___
Bonus Questions

To receive credit for the questions below, all regular test questions must be answered. No partial credit will be given for the bonus questions.

For bonus questions 1-4, select the correct code that was given in class. In order to receive credit for these questions, your name must appear on the sheet signed in class.

Bonus #1 (2 pts) Which of the following is a code from class? A) 77XY  B) 12AB

Bonus #2 (2 pts) Which of the following is a code from class? A) ABC123  B) XYZ789

Bonus #3 (2 pts) Which of the following is a code from class? A) LMN11  B) PQR00

Bonus #4 (2 pts) Which of the following is a code from class? A) Test1  B) Test2

Bonus #5 (+4 pts)
The following program is executed. The user enters the integer “6” when prompted for a number. What is the output to the screen? Just fill in the blanks indicated in the output line shown.

Be careful on this problem. Think about what is being performed with which variables.

```cpp
#include <iostream>
using namespace std;
void summation( int& num, int& result );
int main ()
{
    int number = -1;
    int result = -1;
    cout << "Enter an integer between 1 and 10: ";
    cin >> number;
    summation(number, result);
    // show the output for this cout statement only
    cout << "Summation for " << number << " is: " << result << endl;
    return 0;
}
void summation( int& num, int& result )
{
    int loop;
    result = 0;
    for (loop = num; num >=1; num--)
    {
        result = result + loop;
        num = num -1;
    }
    return;
}

Answer: Summation for ________ is ________