CS 115 Exam 2, Spring 2010

Your name: ____________________________________________

Rules
• You may use one handwritten 8.5 x 11” cheat sheet (front and back). This is the only resource you may consult during this exam.
• Explain/show work if you want to receive partial credit for wrong answers.
• When a snippet of code is given to you, you can assume
  o that the code is enclosed within some function, even if no function definition is shown
  o that the main function is properly defined
  o that the iostream, cstdlib, string, and cmath libraries have been included at the beginning of the program.
• When you are asked to write a snippet of code, you may assume
  o that your code is enclosed within some function
  o that the libraries listed above have been included.
• When you are asked to write a complete program, you must write the #include statements, the int main(), etc. in your solution to receive full credit.
• A line consisting solely of “…” represents one or more unspecified C++ statements, some of which may change the values of program variables.

Grade (instructor use only)

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**Problem 1: 30 points.**
For each part of this problem, assume that the following functions have been declared and defined. However, you should treat each part of this problem independently.

```cpp
void Hello( ) { cout << "Hello\n"; }
void f1(int x){ x = 5; }
int f2(int x) { return 5; }
int f3( ) { return 5; }
int f4(int x) { return x + 1; }
void f5 (int& x) { x++; }
int f6(int& x) { return 2*x; }
```

(a) Given the functions defined above, what does this snippet of code print?
   ```cpp
   Hello( );
   ```

(b) Given the functions defined above, what does this snippet of code print?
   ```cpp
   int x = 0;
   f1(x);
   cout << x;
   ```
(c) Given the functions defined above, what does this snippet of code print?
   int y = 0;
   f2(y);
   cout << y;

(d) Given the functions defined above, what does this snippet of code print?
   int x = 0;
   f2(x);
   cout << x;

(e) Given the functions defined above, what does this snippet of code print?
   int x = 0;
   cout << f3( );
(f) Given the functions defined above, what does this snippet of code print?
   int x = 0;
   cout << f4(f3());

(g) Given the functions defined above, what does this snippet of code print?
   int x = 0;
   f5(x);
   cout << x;

(h) Given the functions defined above, what does this snippet of code print?
   int x = 1;
   int y = f6(x);
   cout << x << " " << y << endl;
Problem 2: 15 points.
For each part of this problem, assume that the following arrays have been declared and defined. However, you should treat each part of this problem independently.

```cpp
string s[5] = {"cat", "dog", "goat", "sheep", "pig"};

// Reminder: this initializes c by row
// That is, each group of 3 elements in curly braces
// is in the same row
char c[3][3] = {
    {'a', 'b', 'c'},
    {'d', 'e', 'f'},
    {'g', 'h', 'i'}
};

(a) Given the arrays defined above, what does this snippet of code print?
cout << s[4];

(b) Given the arrays defined above, what does this snippet of code print?
cout << c[2][0] << endl;
cout << c[0][2] << endl;

(c) Given the arrays defined above, what does this snippet of code print?
for (int i=1; i <= 5; i++) {
    cout << s[i-1] << 't';
}
Problem 3: 25 points.

(a) For an array that has been declared as

```c
float floatArr[5][8];
```

write a snippet of code that initializes all elements of the array to 0.

(b) For an array that has been declared as

```c
int intArr[100];
```

write a snippet of code that prints **YES!** if at least one element of the array is greater than 0 and **NO!** if all elements are less than zero. You should only print **YES!** or **NO!** once.
(c) Write a function that takes 2 integers as input parameters and returns their sum.
Problem 4: 30 points.

For this problem, you must write a **complete program** that contains the following:

- A function, defined **below the main function and prototyped above the main function**, called `ReadNum` with the following properties:
  - Parameters: none
  - Return value: an integer
  - Description:
    - Asks the user for an integer.
    - If the user enters a non-negative integer, returns that integer.
    - If the user enters a negative integer or an invalid integer, returns -1.

- A function, defined **below the main function and prototyped above the main function**, called `LoadArray` with the following properties:
  - Parameters:
    - `arr`, an array of integers
    - `N`, an integer (the size of the array)
    - `value`, an integer
  - Return value: none
  - Description:
    - The function will initialize the first element of the array to `value`, the second to `value+1`, the third to `value+2`, etc.

- A main function that does the following:
  - Declares an array of 1000 ints
  - Calls `ReadNum` to get a single integer from the user.
  - Exits the program if the user did not enter a positive integer.
  - Calls `LoadArray` to initialize the elements of the array to the user’s integer, the user’s integer + 1, etc.
  - Looks through the array element by element. For every element whose square is also an element of the array, prints a statement like ___ is the square of ___.
    - For example, if the numbers 2, 3, 4, and 9 are elements of the array, you would print:
      - 4 is the square of 2.
      - 9 is the square of 3.