CS 101, Spring 2013 — Feb 21st — Exam 1 Name: ______________________________

Question 1. [5 points] Identify the valid variable declaration(s) from the following choices:

A. `int 9Sum;`

B. `int -9Sum;`

C. `int 9 Sum;`

D. `int Nine_Sum;`

Question 2. [5 points] Write the data type (`int`, `float`, `double`, etc.) that would be appropriate for representing each of the following kinds of information in a C program:

The length of a beam: __________________

The number of people in a class: __________________

The number of days in a month: __________________

The average daily temperature in degrees Celsius: __________________

The ratio of a rectangle's width to its height: __________________

Question 3. [5 points] What is the output of the following code?

```
#include <stdio.h>

int main(void) {
    int value;
    printf("%i\n", value / 2);
    value = 12;
    return 0;
}
```

A. It is impossible to tell from the information given

B. $\boxed{\texttt{6}}$

C. $\boxed{\texttt{12}}$

D. The code does not compile

Question 4. [5 points] What is the output of the following code?

```
#include <stdio.h>

int main(void) {
    int a, b;
    a = 4;
    b = a;
    printf("%i ", b);
    a = 5;
    printf("%i", b);
    return 0;
}
```

A. It is impossible to tell from the information given

B. The code does not compile

C. `4 4`

D. `4 5`

Question 5. [5 points] What is the output of the following code?

```
#include <stdio.h>

int main(void) {
    int sum = 7;
    int div = 2;
    float rem = (float)sum / (float)div;
    printf("%f", rem);
    return 0;
}
```

A. 3.000000

B. 1.000000

C. The code does not compile

D. 3.500000

For Questions 6–10, circle “True” or “False”.

Question 6. [2 points] True or False: it is possible for the bodies (statements inside the loop) of `for` loops and `while` loops to execute zero times

Question 7. [2 points] True or False: the `=` operator compares two values to check whether they are equal

Question 8. [2 points] True or False: the expression `(a == 2 || 3)` is true *only* if the variable `a` is equal to either 2 or 3

Question 9. [2 points] True or False: the expression `((a + b) / 2.0)` computes the average of the variables `a` and `b`

Question 10. [2 points] True or False: the expression `2 + (rand() % 2)` is equally likely to result in the values 3 and 4

Question 11. [7 points] Complete the code below so that it prints the maximum of the two values entered by the user. Do not change any of the code already in place.

```
#include <stdio.h>

int main(void) {
   double a, b;

   printf("First value: ");
   scanf("%lf", &a);

   printf("Second value: " );
   scanf("%lf", &b);

   double max;






   printf("Maximum is %lf\n", max);
   return 0;
}
```

Question 12. [8 points] Complete the code below so that it prints the output `21 21 21 21 21`. Do not change any of code already in place.

```
#include <stdio.h>

int main(void) {
   int val, i;




   for (                                                        ) {

      printf("%i ", val);

   }

   return 0;
}
```

Programming Questions

Note: For all of the programming questions, you should use `scanf` to read the input value(s) required by the program.

Note: Make sure your programs produce the output in **exactly** the format described, including capitalization and punctuation. You may not receive credit for programs that produce incorrectly-formatted output.

Getting started: Start **Cygwin Terminal** and **Notepad++**. (Note: do *not* open any other programs.) Your instructor will give you the name of a zip file. In Cygwin Terminal, run the following commands:

```
cd h:
mkdir -p CS101
cd CS101
wget http://faculty.ycp.edu/~dhovemey/spring2013/cs101/assign/zipfile
unzip zipfile
cd CS101_Exam1
```

Substitute the name of the zip file for *zipfile*.

Editing code: Use Notepad++ to open the source file (e.g., `question13.cpp`) referred to in the question. Do not open any files other than the ones for the exam.

Compiling: To compile the program for Question 13, run the following command in Cygwin Terminal:

```
make question13.exe
```

Change the number as appropriate for the other questions (e.g., `question14.exe`).

Running: To run the program for Question 13, run the following command in Cygwin Terminal:

```
./question13.exe
```

Change the number as appropriate for the other questions (e.g., `question14.exe`).

To submit: In Cygwin Terminal, run the command

```
make submit
```

Enter your Marmoset username and password when prompted.

Good luck!

Question 13. [10 points] In the source file called `question13.cpp`, complete the program so that it reads two `double` values, computes their product, and prints their product. For example, if the program reads the values **3.4** and **5.1** as input, the output should be

```
Product is 17.340000
```

Important: your program **must** produce a single line of output that begins with

```
Product is
```

Question 14. [10 points] In the source file called `question14.cpp`, write a program that computes the area of a triangle. Your program should prompt the user for the length of the base of the triangle as well as the height of the triangle. Format your program's output such that the area is printed with 2 decimal places of precision.

The area of a triangle can be found using the following formula:

$(base)(height)\ /\ 2$

An example run is below (user input in **bold**):

```
Enter base: 7.0
Enter height: 5.0
Triangle area is 17.50
```

Important: The program **must** print a line of output of the form `Triangle area is` *X*, where *X* is the computed area of the triangle.

Question 15. [10 points] In the source file called `question15.cpp`, write a program that prompts a user for an integer value and prints one of the following output statements.

- If the user inputs a value less than 0, print '`Negative number`' (without the quotes)
- If the user inputs a value greater than 0, print '`Positive number`' (without the quotes)
- If the user inputs a 0, print '`Neither positive nor negative`' (without the quotes)

Important: The program output must consist of a single line of text which is **exactly** one of the three phrases listed above.

Question 16. [10 points] In the source file question16.cpp, write a program that prints the values from 0 to 100 counting by tens, along with the number that immediately follows the 10s value. **You must use a for loop for this problem.** Your output should look **exactly** like the output shown below. Note that there is a single space between each of the values.

The output of the program should be:

```
0 1 10 11 20 21 30 31 40 41 50 51 60 61 70 71 80 81 90 91 100 101
```

Question 17. [10 points] In the source file called question17.cpp, complete the program so that it prints out the day numbers of all of the days in a week.

The program will read two integer input values. The first input value is the day number of Sunday, i.e., the first day of the week. The second input value is the number of days in the month, which is needed in case the week includes the last day of the current month and the first day of the next month.

Example: if the input values are **10 28** (note that the end of the month *does not* occur), then the output should be

```
10 11 12 13 14 15 16
```

Example: if the input values are **24 28** (note that the end of the month *does* occur), then the output should be

```
24 25 26 27 28 1 2
```

In the second example, Thursday the 28th was followed by Friday the 1st, in a month with 28 days (obviously February.)

Hints:

- Use a for loop that executes *exactly* 7 times
- Use a variable to keep track of the current day number: each execution of the loop should print and update this variable
- Print a space after each day number
- Print all of the day numbers on a single line of output
- Use an if statement to handle the case where the last day of the month changes to the first day of the next month