CS 101, Spring 2017 — Mar 14th — Exam 2 Name: ____________________

Question 1. [5 points] If i = 4 and j = 2, what will print: true or false? Briefly explain.

```
if ((i != 3) || (j < 2)) {
    printf("true");
}
else {
    printf("false");
}
```

true is printed because i != 3 is true, and the logical operator is || (or)

Question 2. [5 points] Briefly explain the bug(s) in the following code, which is intended to compute the sum of the integers from 1 to 10:

```
int sum;
for (int i = 1; i < 10; i++) {
    sum = sum + i;
}
printf("Sum is %i\n", sum);
```

The loop variable sum is not initialized to 0

Question 3. [5 points] Circle which one of the following is most likely to be correct if used in C programming?

a. `for (int i = 0; i < 10, i++);`

b. `while (int i = 0; i < 10; i++)`

[✓ c. `for (int i = 0; i < 10; i++)`]

d. `for (int i = 0, i < 10, i++)`

e. `for (int i = 10; i >= 10; i++)`

Question 4. [8 points] Write code that simulates one roll of a 6-sided die and prints out the resulting value.

```
int roll = (rand() % 6) + 1;
printf("%i", roll);
```

Question 5. [5 points] Briefly explain the bug(s) in the following code, which is intended to print the integers from 1 to 5:

```
int i = 0;
while (i <= 5) {
    printf("%i\n", i);
}
```

Within the body of the loop, the loop variable i is not incremented, so the loop does not terminate

Question 6. [5 points] What output is printed by the following code? (Note: make sure you read carefully!)

```
int x = 0;
int y = 1;
while (x = 0) {
    printf("%i\n", y);
    y = y + 1;
    if (y = 5) {
        x = 1;
    }
}
printf("Done\n");
```

It prints only

Done

because

x = 0

is an assignment whose value is effectively false

Question 7. [2 points] What is the Boolean operator in C for logical **OR** ?

||

Question 8. [5 points] Consider the following partially-specified code:

```
int n;
printf("Enter a positive integer: ");
scanf("%i", &n);

for (int i = 1; i <= n; i++) {
    int x = Missing;
    printf("%i\n", x);
}
```

The goal is to complete the code so that it prints out the first **n** positive odd integers, starting from 1. Example run (user input in **bold**):

```
Enter a positive integer: 5
1
3
5
7
9
```

i	i*2	(i*2)-1
1	2	1
2	4	3
3	6	5
4	8	7
5	10	9

What code should be substituted for Missing? Note that you should not define any new variables. Hint: give an expression which uses i, the loop variable.

(i * 2) - 1

Question 9. [10 points] Write the output of this code as it executes.

```
double sum = 0;
int i, j;

for (i = 0; i < 3; i++)
{
      for (j = 0; j <= 3; j++)
      {
          sum += i*j;
          printf("i = %i, j = %i, sum = %i\n",i,j,sum);
      }
}
```

Note: this should be int, not double

output:

```
i=0, j=0, sum=0
i=0, j=1, sum=0
i=0, j=2, sum=0
i=0, j=3, sum=0
i=1, j=0, sum=0
i=1, j=1, sum=1
i=1, j=2, sum=3
i=1, j=3, sum=6
i=2, j=0, sum=6
i=2, j=1, sum=8
i=2, j=2, sum=12
i=2, j=3, sum=18
```

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++** and make sure ALL TABS are closed. (Note: do *not* open any other programs.) Your instructor will give you the name of a zip file. In your terminal, run the following commands:

```
cd h:
mkdir -p CS101
cd CS101
curl -O http://faculty.ycp.edu/~dhovemey/spring2017/cs101/zipfile
unzip zipfile
cd CS101_Exam02
```

Note that in the `curl` command, the `-O` has the letter 'O', not the digit '0'.

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

Editing code: Use your text editor to open the source file (e.g., `question10.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 10, run the following command in the terminal:

```
make question10.exe
```

Change the number as appropriate for the other questions (e.g., `question11.exe`).

Running: To run the program for Question 10, run the following command in the terminal:

```
./question10.exe
```

Change the number as appropriate for the other questions (e.g., `question11.exe`).

To submit: In Cygwin Terminal, run the command

```
make submit
```

Enter your Marmoset username and password when prompted.

Good luck!

Question 10. [25 points] Complete the program in `question10.cpp` so that it reads a single `int` value N from the user and then prints a line with the form

```
Sum is X
```

where X is the sum of the first N odd integers. For example, if the input value N is 3, then the program should print the output

```
Sum is 9
```

because 1, 3, and 5 are the first three odd integers and

$$1 + 3 + 5 = 9$$

Example run (user input in **bold**):

```
Enter a positive integer: 3
Sum is 9
```

Example run (user input in **bold**):

```
Enter a positive integer: 7
Sum is 49
```

Hints:

- Write a loop that executes N times
- Each iteration of the loop must compute the next odd number and add it to the sum. You may `NOT` use the modulo operator to determine the odd integers
- The sum variable should be defined and initialized before the loop starts

Question 11. [25 points] Complete the program in `question11.cpp` so that it repeatedly reads `integer` values until a -1 value is read. After the -1 value is read, the program should print a message of the form

```
Even integers: N
```

where N is the total number of even integers entered.

Example run (user input in **bold**):

```
Enter integers:
11
12
16
13
19
6
4
-1
Even integers: 4
```

Hints:

- Make sure your loop variable(s) are initialized correctly
- You will need *at least* two loop variables (one to count even input values and one to control the loop)