CS 101, Spring 2014 — Feb 27th — Exam 1 Name: ______________________

Question 1. [5 points] Show a variable declaration for a variable named `num_friends` that represents the number of friends a person has. Be sure to use an appropriate data type.

int num_friends; (the number of friends is an integer)

Question 2. [5 points] Show a variable declaration for a variable named `temperature` that represents a temperature in Celsius. Be sure to use an appropriate data type.

double temperature; (could also be float)

Question 3. [5 points] Consider the following code:

```
double hours;
printf("How many hours did you work? ");
scanf("%i", &hours);
double wages = hours * 20.0;
printf("You earned $%.2lf\n", wages);
```

What error do you see in this code?

hours is a double yet the scanf is reading an integer using %i, should be %lf

Question 4. [5 points] Consider the following code:

```
int a = 7;
int b = 4;
int c = a % b;
printf("%i\n", c);
```

What output is printed by this code?

note % is the modulus operator, i.e. remainder

$$\begin{array}{r} 1 \\ 4\overline{)7} \\ 4 \\ \boxed{3} \end{array}$$

thus 7%4 = 3 so the output will be 3

Question 5. [5 points] Consider the following code:

```
double a, b, c;
scanf("%lf", &a);
scanf("%lf", &b);
scanf("%lf", &c);
```

Write a statement or statements that will compute the average of the values stored in the variables a, b, and c, and then print the average.

```
double avg;

avg = (a+b+c)/3.0;
printf("The average is %lf\n", avg);
```

Question 6. [5 points] Consider the following code:

```
int a;
scanf("%i", &a);
int b = 0;

if (a < 0) {
    b = 3;
} else {
→   b = 4;
}
printf("b=%i\n", b);
```

$0 \not< 0$ so condition is <u>false</u>
so else branch executes

What output is printed if the user enters the value 0?

b=4

Question 7. [5 points] Consider the following incomplete code:

```
int value;
scanf("%i", &value);                or

if ((Value<0) || (value >=100)                  ) {

    printf("Yes!\n");
}
```

Fill in a condition for the `if` statement that will make the code print the output `Yes!` if the value the user enters is *either*

- less than 0, or
- greater than or equal to 100

Question 8. [10 points] Consider the following code:

```
printf("Enter an integer: ");
scanf("%i", &~~count~~);
               num                num
for (count = 1; count <= ~~count~~; count++) {
    printf("%i ", count);
}
```

The intent of this code is to print the integers from 1 to the number that the user enters. For example, if the user enters the value 5, we want the code to print the output

```
1 2 3 4 5
```

(a) State two errors in the code.

- Cannot use count as loop variable since it will erase user entered value

- Cannot compare the loop counter to itself since any variable will always be equal to itself

(b) Show how to fix the errors you identified in part (a) by crossing out incorrect code (where appropriate) and showing correct code to insert.

Change user input variable

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
curl -O http://faculty.ycp.edu/~dhovemey/spring2014/cs101/assign/zipfile
unzip zipfile
cd CS101_Exam1
```

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 Notepad++ to open the source file (e.g., `question9.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 9, run the following command in Cygwin Terminal:

```
make question9.exe
```

Change the number as appropriate for the other questions (e.g., `question10.exe`).

Running: To run the program for Question 9, run the following command in Cygwin Terminal:

```
./question9.exe
```

Change the number as appropriate for the other questions (e.g., `question10.exe`).

To submit: In Cygwin Terminal, run the command

```
make submit
```

Enter your Marmoset username and password when prompted.

Good luck!

Question 9. [30 points] Write a program that acts as a simple filter. That is, it receives an input, it checks the value of that input against some conditions, and then produces a result that is determined by those conditions.

The simple filter you must write for this program will receive a single integer value as input. For input values that are both even numbers *and* are greater than or equal to 70, the filter should simply print "Pass". For all other values the filter should print "Fail".

For example if the input is 84, the output of your filter should simply be the following:

```
Pass
```

If the input is 85, the output of your program should be the following:

```
Fail
```

Hints:

- Use logical operators to check both conditions in a single boolean expression
- Use a single if-else statement and print the appropriate output in the body of the if clause or the body of the else clause.
- You can use the modulus operator to determine if a number is even or odd. If you divide a number by 2 and the remainder is 0, then the number is an even number. If you divide a number by 2 and the remainder is 1, then the number is an odd number.

```
int num;
Scanf("%i", &num);

if (num%2 == 0 && num >= 70) {
    printf("Pass");
} else {
    printf("Fail");

}
```

Question 10. [25 points] Complete the program in the file `question10.cpp` as follows:

- It should read and maximum temperature values in Fahrenheit (F).
- Starting from the minimum temperature entered, and continuing by increments of 10 degrees F up to the maximum temperature, the program should print (on separate lines) the Fahrenheit and Celsius temperatures in the format shown below.

The format of each line of output should be:

$\boxed{XX.XX}$`F, `$\boxed{YY.YY}$`C`

$\boxed{XX.XX}$ should be replaced by the Fahrenheit temperature, and $\boxed{YY.YY}$ should be replaced by the Celsius temperature. Each temperature should be printed with two digits of precision after the decimal point.

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

```
Enter min temperature (F): 44.5
Enter max temperature (F): 98.1
44.50F, 6.94C
54.50F, 12.50C
64.50F, 18.06C
74.50F, 23.61C
84.50F, 29.17C
94.50F, 34.72C
```

Hints:

- Use the formula $C = (F - 32) \times (5/9)$ to convert from Fahrenheit (F) to Celsius (C)
- Be sure to avoid doing any integer division (where both operands are integers)

```
double min, max;
printf("Enter min temp (F): ");
scanf(" %lf ", &min);
printf("Enter max temp (F): ");
scanf(" %lf", &max);
for(double temp = min; temp <= max; temp += 10.0){
    double ctemp = (temp-32)*(5.0/9);
    printf(" %.2lf F, %.2lfC\n", temp, ctemp);

}
```