NAME: SECTION:

USERNAME:

CS 2301
Sample Exam 1

1. (20 points) A C program makes the following declarations:

```
int i = 27;
int j = 6;
int k;
float f = 27.0;
float g;
```

   (a) If the program executes this statement:

```
k = i / j;
```

   what would be the value of the variable **k**?

   (b) If the program executes this statement:

```
k = i % j;
```

   what would be the value of the variable **k**?

   (c) If the program executes this statement:

```
g = i / j;
```

   what would be the value of the variable **g**?

   (d) If the program executes this statement:

```
k = f / j;
```

   what would be the value of the variable **k**?

2. (15 points) Write an if-statement that does the same thing as the following switch statement

```
switch (grade)
{
   case 'A':
         acount++;
         printf ("honors\n");
         break;

   case 'B':
         bcount++;
         break;

   case 'C':
         ccount++;
         break;

   default:
         NRcount++;
         printf ("no credit\n");
 }
```

3. (15 points) Write a *recursive* C function called `countUp` that prints the numbers in a range of integers. For example, a call to the function

   ```
   countUp(5,9);
   ```

   would display the output

   ```
   56789
   ```

   and a call

   ```
   countUp(3,3);
   ```

   would display

   ```
   3
   ```

   Here are the pre- and post-conditions for the function:

   ```
   PRE:  start and end are positive ints, start <= end
   POST: all the integers in the range start...end have been displayed on the
   terminal
   ```

4. (25 points) In this problem you will design a function that determines the amount of the bill for a meal in a restaurant. First, a subtotal is calculated by adding an 8% tax to the cost of the meal. If there are 8 or more people in the party, a tip of 15% of the subtotal is then added to the bill. Design your function in four steps:

   (a) Draw a black box for the function, showing input arrows and output arrows as we did in class. Name the function *mealCost*.

   (b) Define a prototype for the function.

   (c) Write the function as a stub.

   (d) Write the complete function (function header and function body).

5. (25 points) An array named `numStars` is declared and initialized with these statements:

```
int numStars[5];
int i;

printf ("Enter the number of stars you want in each row:  ");
for ( i=0; i < 4; i++)
  scanf ("%d", &numStars[i]);
```

In this problem, you will write the C code that displays a histogram of stars. The number of stars that are printed for each row are contained in the array `numStars`. So if the values in the array are 2, 9, 1, 6, and 5, the histogram you would print out would look like this:

```
**
*********
*
******
*****
```

(a) (10 points) First, write a for-loop that will execute 5 times (because there are 5 elements in the array `numStars`). Each time through the loop, you should print out a newline character.

(b) (10 points) Now re-write your loop from part (a), adding the statements that will produce the histogram based on the values in the array `numStars`.