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:
    
    \[
    k = i \div j;
    \]

    what would be the value of the variable \( k \)?

(b) If the program executes this statement:
    
    \[
    k = i \mod j;
    \]

    what would be the value of the variable \( k \)?

(c) If the program executes this statement:
    
    \[
    g = i \div j;
    \]

    what would be the value of the variable \( g \)?

(d) If the program executes this statement:
    
    \[
    k = f \div j;
    \]

    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

```c
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

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

would display the output

```
56789
```

and a call

```c
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:

```c
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.