June 12th, 2015 Quiz 4

Total Score _______. Your work is to be done individually. The quiz is worth 50 points and it has 8 questions. Unless a problem directly instructs you differently, there are no known errors within this document. All programming solutions will be implemented in the C programming language. You only need to write the fragment of code that directly answers each question. Unless otherwise specified you do not have to write a full program for any of the questions.

1. [10 pts] Create a function that rounds a float value that it receives as a parameter. You may assume that the float value is positive. Whether numbers at the midpoint (e.g. 10.5) round up or down is up to you. Include a comment about your decision. You may not use any functions declared in the math.h library (such as round, ceil or floor); if you do so, you will not get points for this problem.

```c
int round(float f) {
    int intPart = (int)f;
    float decimals = f - intPart;
    if(decimals < 0.5f) { //numbers at the midpoint round up.
        return intPart;
    }
    else {
        return intPart + 1;
    }
}
```

2. [10 pts] For this question you will refer to your answer of question 1. What would be the output for your function if it was called with -7.30f as a parameter? What about the output for -8.60f? Would those be the correct rounded value? Explain why or why not.

The result of round(-7.30f) would be -7, which is the correct value. The result of round(-8.60f) would be -8, which is incorrect. The problem is that the strategy used to compute the decimals keeps the negative sign of the number, and the condition for my if statement will always be true.
3. [15pts] Given this code fragment, fill the table provided following the execution of \( \text{foo}(21, 0, 9) \). Each row on the table represents a call to \( \text{foo} \). On the first column write \( \text{foo} \) and the values of the three parameters with which it is called. On the second column, the value of the local variable \( \text{middle} \) if it is computed. On the third one, the value of \( \text{array}[\text{middle}] \), if it is computed. For the last call provide the return value of the call. (There are enough rows for all calls, but not all of them might be required).

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Call to \text{foo}} & \text{Value of middle} & \text{Value of \text{array}[middle]} & \text{Return value (only for last call)} \\
\hline
\text{foo}(21, 0, 9) & 4 & 0 & \\
\text{foo}(21, 5, 9) & 7 & 24 & \\
\text{foo}(21, 5, 6) & 5 & 3 & \\
\text{foo}(21, 6, 6) & 6 & 21 & 6 \\
\hline
\end{array}
\]

4. [15pts] The transpose of a matrix is a new matrix whose rows are the columns of the original. Given the two-dimensional arrays \( \text{A} \) and \( \text{B} \) that represent matrices, create a function that will assign the transpose of \( \text{A} \) to \( \text{B} \). Assume \( \text{ROWS} \) and \( \text{COLS} \) are already defined constant integers.

```c
float \text{A}[\text{ROWS}][\text{COLS}];
float \text{B}[\text{COLS}][\text{ROWS}];

\text{void transposeA(void)}
\{ 
    \text{int} \text{i, j};
    \text{for}(\text{i} = 0; \text{i} < \text{ROWS}; \text{i}++)
    \{ 
        \text{for}(\text{j} = 0; \text{j} < \text{COLS}; \text{j}++)
        \{ 
            \text{B}[\text{j}][\text{i}] = \text{A}[\text{i}][\text{j}];
        \}
    \}
\}
```