Goal:
Read, write and manipulate bitmap image files.

Assignment:
Write a C++ program that reads a .bmp image file, manipulates the contents of the image file and then writes new image files using the modified data.

Specifically, you will need to read all of the image header information and store that data in the appropriate variable(s). The header information will provide details on how to read the actual image data. Using the information contained in the image header, read the image data and store that in the appropriate variable(s). Your program is required to process images with a color depth of 24 bits.

Manipulate the image in two ways:

1. Convert the image from color to grayscale
2. (EXTRA CREDIT) Invert the image

Write the manipulated data to binary files, this will create two new .bmp files that display the modified versions of the original file (do NOT overwrite the original image file).

An example of an image and the two new manipulated images is shown below.

<table>
<thead>
<tr>
<th>Original Image</th>
<th>Grayscale Image</th>
<th>Inverted Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Original Image" /></td>
<td><img src="image2.jpg" alt="Grayscale Image" /></td>
<td><img src="image3.jpg" alt="Inverted Image" /></td>
</tr>
</tbody>
</table>
The skill set required for this assignment includes:

- Using records (struct) data types (optional)
- Reading data from binary files
- Writing data to binary files
- Interpreting the contents of bitmap image files
- Manipulating the contents of bitmap image files
- Dynamic Arrays (optional)

Information on bitmap image format can be found on Wikipedia ([http://en.wikipedia.org/wiki/BMP_file_format](http://en.wikipedia.org/wiki/BMP_file_format))

And information on converting color to grayscale can be found on Wikipedia ([http://en.wikipedia.org/wiki/Grayscale](http://en.wikipedia.org/wiki/Grayscale))

This graded assignment is worth 100 points and will be counted as part of your programming grade for the course.

The product that you submit must be your own work. Collaboration is allowed as specified within the syllabus for this course. For this assignment, you are not required to submit an acknowledgement statement.

Your programs must be posted to Blackboard no later than 11:59 pm on Thursday, November 3, 2011.