CS 3005: Programming in C++

Color Table Class

A color table is an array of colors. It is useful for translating a single number in a range into a color, reliably.

We will use a color table to translate Julia set escape values into colors to create images.

Assignment

Create a class named `Color` and one named `ColorTable`. These classes must have the methods listed below, with the specified behaviors.

Programming Requirements

Your `Color` class must store the following data.

- The integer representation of red, green and blue channels of a color.

Your `Color` class must have the following methods.

Constructors and Getters

- `Color(void)`: Sets all color channels to value 0.
- `Color(const int& red, const int& green, const int& blue)`: Sets the color channels to the values provided here. No range checking is applied.
- `int getRed(void) const`: Returns the value of the red channel.
- `int getGreen(void) const`: Returns the value of the green channel.
- `int getBlue(void) const`: Returns the value of the blue channel.
- `int getChannel(const int& channel) const`: Returns the value of the `channel`th channel. 0 == red, 1 == green, 2 == blue. Returns -1 if the channel is out of range.

Setters

- `void setRed(const int& value)`: Changes the red channel to `value`. If `value` is less than 0, do not make any changes.
- `void setGreen(const int& value)`: Changes the green channel to `value`. If `value` is less than 0, do not make any changes.
- `void setBlue(const int& value)`: Changes the blue channel to `value`. If `value` is less than 0, do not make any changes.
- `void setChannel(const int& channel, const int& value)`: Changes the `channel`th channel to `value`. If `value` is less than 0, do not make any changes. 0 == red, 1 == green, 2 == blue. Does not make changes if `channel` is out of range.

Other Methods

- `void invert(const int& max_color_value)`: Inverts the red, green and blue channels, using `max_color_value`. If `max_color_value` is less than any of the current color channels (red, green or blue), then make no changes.
- `bool operator==(const Color& rhs) const`: Returns `true` if `*this` and `rhs` have the same color values. Otherwise, returns `false`.

Your `ColorTable` class must store the following data.

- A linear collection of `Colors`.

Your `ColorTable` class must have the following methods.

Constructor and Getters

- `ColorTable(const size_t& num_color)`: Sizes the `Color` collection to `num_color` items.
- `size_t getNumberOfColors(void) const`: Returns the number of `Color`s stored.

Setters
- `void setNumberOfColors( const size_t& num_color );` Resizes the collection to hold `num_color` items. Previous `Color` contents may or may not be preserved.

**Operators**

- `const Color& operator[]( const int& i ) const;` Returns the `i`th `Color` in the collection. If `i` is out of range, returns a static memory `Color` object with all three channels set to `-1`.
- `Color& operator[]( const int& i );` Returns the `i`th `Color` in the collection. If `i` is out of range, returns a static memory `Color` object with all three channels set to `-1`.

**Other Methods**

- `void setRandomColor( const int& max_color_value, const size_t& position );` Assigns the `position`th color random values for all three channels. The random values are between 0 and `max_color_value`, inclusive. If `position` is out of range, no change is made. If `max_color_value` is less than 0, no change is made.
- `void insertGradient( const Color& color1, const Color& color2, const size_t& position1, const size_t& position2 );` Change the colors from `position1` to `position2`, inclusive, to be gradients from `color1` to `color2`. If `position1` is not less than `position2`, no change is made.

**Additional Documentation**

- Consider using the `std::vector` class template.

**Show Off Your Work**

To receive credit for this assignment, you must complete the unit tests available in CodeGrinder.