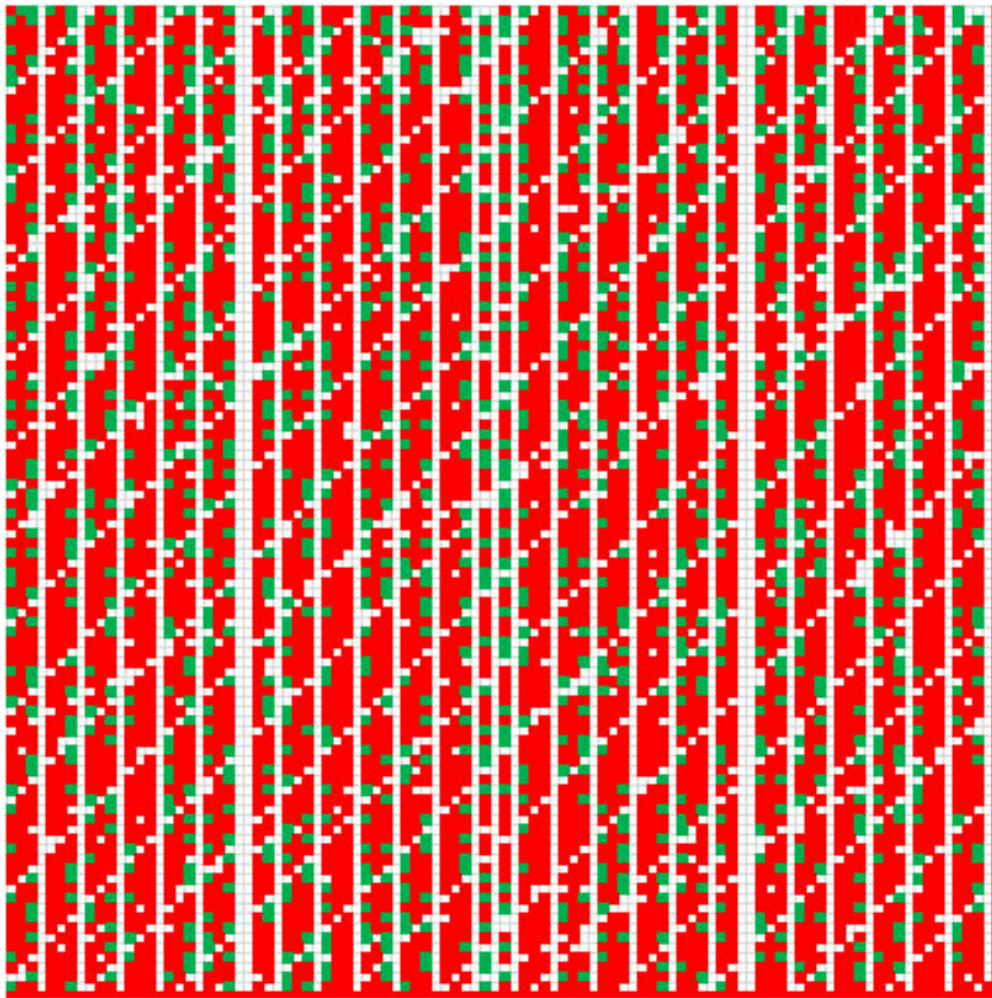


CS007A: Primes and Square Free Numbers – Part 2



In this project we use the sieve of Eratosthenes to create a file containing rows and columns of the numbers 0, 1 or 2. If i is prime then write a 1, if i is composite and square free, write a 0, otherwise, if i is not square free, write a 2. Separate the entries by spaces and insert a newline every 100 characters, or so. You can then import the file into MS Excel (or some other spreadsheet) and use conditional formatting to produce a picture such as that above.

Note: You are not required to produce the Excel spreadsheet, but if it amuses you, here's how you do it.

1. In MS Excel, from the file menu choose "files of type txt" and then locate "spreadsheet.txt" (or whatever file name you used to store the data) and double click on it to bring up the Text Import Wizard.
2. Make sure the "Fixed width" option is chosen and click "finish." You should have your data in rows and columns.
3. Hit ctrl+a to choose all the columns, choose "View" from the menu across the top and then the Page Layout tab in the Workbook Views group just below the menu across the top.
4. Right click on the column headers area and a menu comes up that should include "column width." Choose "column width" and enter a small value in the dialog box, like 0.06". Click "OK."
5. Now the row heights need to be shrunk. Right click in the row numbers column area on the left side of the spreadsheet. Choose "row height" from the menu and enter 0.06".
6. Hit the "Home" tab to the right of "File" on the menu across the top of the window and choose "Conditional Formatting" in the "Styles" group. Choose a "new rule" to "Format only cells that contain "Cell Value" "equal to" and enter "0" in the field and then click the "format" tab and choose "fill" with a color of your choice. Click "OK" twice.
7. Repeat step 6 to make rules for "1" and "2" colors and there you are!

Here is the outline of the file. Write code for the various functions to make it work. Turn in the .cpp file with your initials (as usual) and something to indicate "SquareFree2."

```
using namespace std;

void eratosthenes(short [], const int);
void squareFree(short [], const int);

int main()
{
    const int SIZE = 100;
    const int MAX = SIZE*SIZE;
    short primes[MAX];
    //Determine which of the first MAX-1 natural numbers are prime and
    //fill an array with true/false values.
    eratosthenes(primes, MAX); // Note: the array is passed by reference
    //Determine which of the primes are not square free and write '2'
    //into those positions
    squareFree(primes, MAX);
    ofstream writeFile("spreadsheet.txt");
    for(int i = 1; i < MAX; i++)
    {
        writeFile << primes[i] << " ";
        if(i%SIZE==0) writeFile << endl;
    }

    /*for (int i=1; i<MAX; i++)
    {
        //if (primes[i]) cout << i << " ";
        if(primes[i]==0) cout << (char)3;
        else if(primes[i]==1) cout << " ";
        else cout << (char)6;
        if (i%64 == 0) cout << endl;
    }
    cout << endl;*/
    return 0;
}

void eratosthenes(short primes[], const int M)
{
    //write code here
}

void squareFree(short pr[], const int M)
{
    //write code here
}
```