Assignment 2: Memory Hierarchy Optimization
Due Fri day, February 8 at 5PM

Sobel edge detection:
Find the boundaries of the image where there is significant difference as compared to neighboring “pixels” and replace values to find edges

for (i = 1; i < ImageNRows - 1; i++)
    for (j = 1; j < ImageNCols - 1; j++)
    {
        sum1 = u[i-1][j+1] - u[i-1][j-1] + 2 * u[i][j+1] - 2 * u[i][j-1] + u[i+1][j+1] - u[i+1][j-1];
        sum2 = u[i-1][j-1] + 2 * u[i-1][j] + u[i-1][j+1] - u[i+1][j-1] - 2 * u[i+1][j] - u[i+1][j+1];

        magnitude = sum1*sum1 + sum2*sum2;
        if (magnitude > THRESHOLD)
            e[i][j] = 255;
        else
            e[i][j] = 0;
    }
Example

Input

Output
General Approach

0. Provided
   a. Input file
   b. Sample output file
   c. CPU implementation

1. Structure
   a. Compare CPU version and GPU version output [compareInt]
   b. Time performance of two GPU versions (see 2 & 3 below) [EventRecord]

2. GPU version 1 (partial credit if correct)
   implementation using global memory

3. GPU version 2 (highest points to best performing versions)
   use memory hierarchy optimizations from previous, current lecture

4. Extra credit: Try two different block / thread decompositions. What happens if you use
   more threads versus more blocks? What if you do more work per thread? Explain your
   choices in a README file.

Handin using the following on CADE machines, where probfile includes all files

   “handin cs6235 lab2 <probfile>”