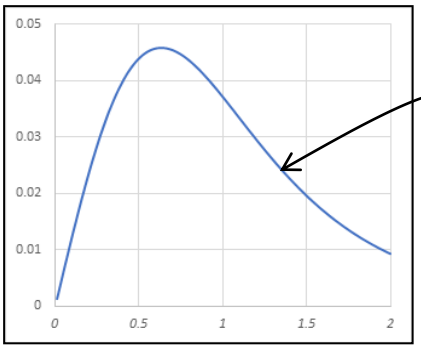
Homework Assignment 10 – due on Saturday, December 9 (Midnight)

Description of Assignment:

Complete the CUDA program(area.cu) which computes the area under the curve of a graph *f(x)* shown in the following figure. Your program should measure execution time using cudaEvent and calculate GFLOPS. In the program, use **float** and **int** for variables, and the number of segments(N) is 128,000 and the number of threads(THREADS) is 128.



$$f(x) = \frac{x}{(x^2+2)^3}$$

```
#include <stdio.h>
#include <math.h>

#define N 1280000

#define THREADS 128

__device__ float f(float x)
{
    // (1) COMPLETE
}

__global__ void area_kernel(float *sums)
{
    float a, b, dx, x, y;
    int i = blockDim.x*blockIdx.x+threadIdx.x;
    __shared__ float sdata[THREADS];

    // (2) COMPLETE
    sdata[threadIdx.x] = …;

}

int main()
{
    float *sums, *sums_d, area, elapsed;
    int i;

    dim3 dimBlock(THREADS);
    dim3 dimGrid((N+dimBlock.x-1)/dimBlock.x);
    cudaEvent_t start, stop;

    cudaMalloc((void **) &sums_d, sizeof(float)*dimGrid.x);
    sums = (float*)malloc(sizeof(float)*dimGrid.x);


    // (3) COMPLETE (timing - start)

    // (4) COMPLETE ( call GPU function)

    // copy values from GPU memory to CPU memory
    cudaMemcpy(sums, sums_d, sizeof(float)*dimGrid.x,
cudaMemcpyDeviceToHost);

    // (5) COMPLETE (timing - stop)

    // add the computed value to the value of pi
    area = 0.0;
    for (i=0; i<dimGrid.x; i++)
        area += sums[i];

    printf("area: %5.10f\n", area);
    printf("elapsed time: %f milliseconds\n", elapsed);
    printf("GFLOPS: %5.2f\n",
(N*16.0/(elapsed/1000.0))/1000000000.0);

    cudaFree(sums_d);
    free(sums);
}
```

Turnin the assignment:

After done your assignment, type **turnin** in your current working directory. You can retype the command at any time before the due date.