2. Experiment 1.

The Question asks us to draw graph(“…Draw a bar-graph where x-axis is th...”).

The question 4 asks us to draw same graph. So I put it in question 4, again.

4.

5.

a)

Fig 3. The result of nvcprof for varing dismension. The iteration is fixed to 1000.

Across all dimension and iteration, GPU is faster than CPU.

When the dimension size is above 4000, GPU usage is more beneficial. Before dimension 4000, the cudamemcpy time has above 96%. The time for actual GPU calculation(cudaLaunh) is below 3% (Fig 3). However, When the dimension is above 4000, the time of cudamemcpy reduced to 52~53% and the the time for actual calculation(cudaLaunch) increased to 46~47%. Among them, GPU is fastest at 16000 compared to CPU(CPU/GPU time is 5.4. At other iteration, they were 8.2 and 8.5, Fig 4).

When we fixed dimension to 1000 and vary the iteration from 1000 to 32000, there is no much difference between times for cudamemcpy and cudalaunch.

b)

Fig 4. Time of CPU/Time of GPU according to Dimension and iteration

The speed up is lowest at dimension 1000 , iteration 1000. It is lowest as 4.87 in varying dimension. At this dimension, the time for cudamemcpy is 97.21 %. The data is not big enough to overcome the communication cost.

c)

The speedup (time of CPU/time of GPU) is highest at 4000 dimension with 1000 iteration.

The dimension 4000 is big enough to overcome communication time. As show in Fig 3, the cpumencpu time is just 52%. Also, it seems that the data size is small enough not to miss cache unlike dimension 16000 which have low gpu/cpu time and low percent of time for data communication(cudamemcpy).

When we set dimension to 1000, the cpu/gpu time show almost no difference in varying iteration (Fig 4).

d)

Increase of number of problem size is more effect than that of iteration size. If dimension is not big enough, iteration is just increasing the time taken for data communication like cudamemcpy. The percentage of data communication is not changing with increasing number of iteration(Fig 5).

In Fig 5, the percentage of time taken by cudamemcopy with varying iteration.