
Problem 1: The kernel below is launched in a configuration of grid size of (1024, 1, 1) and block size of (256, 1, 1). (The components are (x, y, z).)

```c
__global__ void dots_iterate1() {
    int thread_count = /* Omitted so things aren’t too obvious. */;
    int idx_start = threadIdx.x + blockIdx.x * blockDim.x;
    for (int idx = idx_start; idx < array_size; idx += thread_count)
        b[idx] = v0 + v1 * a[idx]; }
```

(a) How many threads are there? How many blocks? How many warps?

(b) Suppose the array size is $5 \times 10^5 = 500,000_{10} = 7a120_{16}$ elements. How many threads will perform two iterations? One iteration? Zero iterations?

(c) A GPU has four multiprocessors. Explain why launch configurations of four and eight blocks are each better than a launch configuration of six blocks. Use the code above as an example.
**Problem 2:** Consider the kernel code below. It is launched with a block size of 512 threads and a grid size of 64 blocks. The array has $2^{20} = 1048576$ elements.

```c
__global__ void dots_iterate15() {
    int thread_count = /* Omitted so things aren't too obvious. */;
    int tid = threadIdx.x + blockIdx.x * blockDim.x; // Not used in code.
    int idx_start = blockIdx.x + threadIdx.x * gridDim.x;

    for ( int idx = idx_start; idx < array_size; idx += thread_count )
        b[idx] = v0 + v1 * a[idx];
}
```

(a) The table below shows various information about selected threads in the launch described above. The first three columns should be self-explanatory. The three columns headed `idx` show the element number (value of `idx` in the code above) accessed by the respective thread in the first, second, and third iteration of the `for` loop. Each row has at least one column filled. Fill the remaining columns.

<table>
<thead>
<tr>
<th>tid</th>
<th>blockIdx.x</th>
<th>threadIdx.x</th>
<th>First Iter</th>
<th>Second Iter</th>
<th>Third Iter</th>
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