Practice 7: Histogram

Objective: To implement parallel algorithms to compute histogram computational pattern

Practice 7.1: You are to implement a parallel histogramming algorithm that takes as input an array of integers within a given range.

Requirements:
- Each integer maps into a single bin. So, the values will range from 0 to NUM_BINS-1.
- The histogram bins use unsigned 32-bit counters that must be saturated at 127 (no roll back to 9 allowed)
- The input length can be assumed to be at most 2^{32}
- NUM_BINS is fixed at 4096

NOTE: You may think of splittng the code into two kernels:
- One that does a histogram without saturation.
- And a final kernel that cleans up the bins if they are too large.
- These two stages can also be combined into a single kernel.

Practice 7.2: You are to implement a parallel histogramming algorithm that takes as input an array of ASCII characters.

Requirements:
- There are 128 ASCII characters and each character will map into its own bin for a fixed total of 128 bins
- The histogram bins use unsigned 32-bit counters that do not saturate.
- Use the approach of creatinga privitized histogram in shared memory for each thread block, then atomically modifying the global histogram.