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## **CS179 Project Proposal**

### **Summary**

I would like to work on parallelizing random number generation, and then extend it to generating samples from other commonly used distributions, such as Gaussian, binomial etc.

### **Project Background**

There are well-documented ways to generate pseudo-random numbers using CUDA, such as linear congruential generator, multiple recursive generator, lagged Fibonacci generator and Mersenne twister. These methods generate pseudo-random numbers from a uniform distribution. There are also existing methods to transform the uniform distribution to Gaussian distribution. Examples include the Ziggurat method and the polar method. However, the transformation to other distributions, like the binomial distribution, is not as well-documented, but also important and commonly used in many applications.

Since random number generation is not similar to any of the labs done so far, I would need to first figure out the CPU implementation, and then work on parallelizing it. I hope to at least complete the transformation to a Gaussian distribution, and hopefully extend it to other distributions. Otherwise, I would like to have a more in depth understanding of the challenges of generating pseudorandom numbers in CUDA.

The project should be completed in 4 weeks. My proposed timeline is as follows:

Week 1: Understand how pseudorandom numbers are generated, work on CPU implementation

Week 2: Finish CPU implementation for uniform distribution, start on transformation to Gaussian distribution

Week 3: Finish CPU implementation for Gaussian distribution, start on parallelization of CPU implementation of uniform and Gaussian distributions

Week 4: Work on transforming to other distributions