

Lecture 7: Basic Sampling

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Sampling the uniform

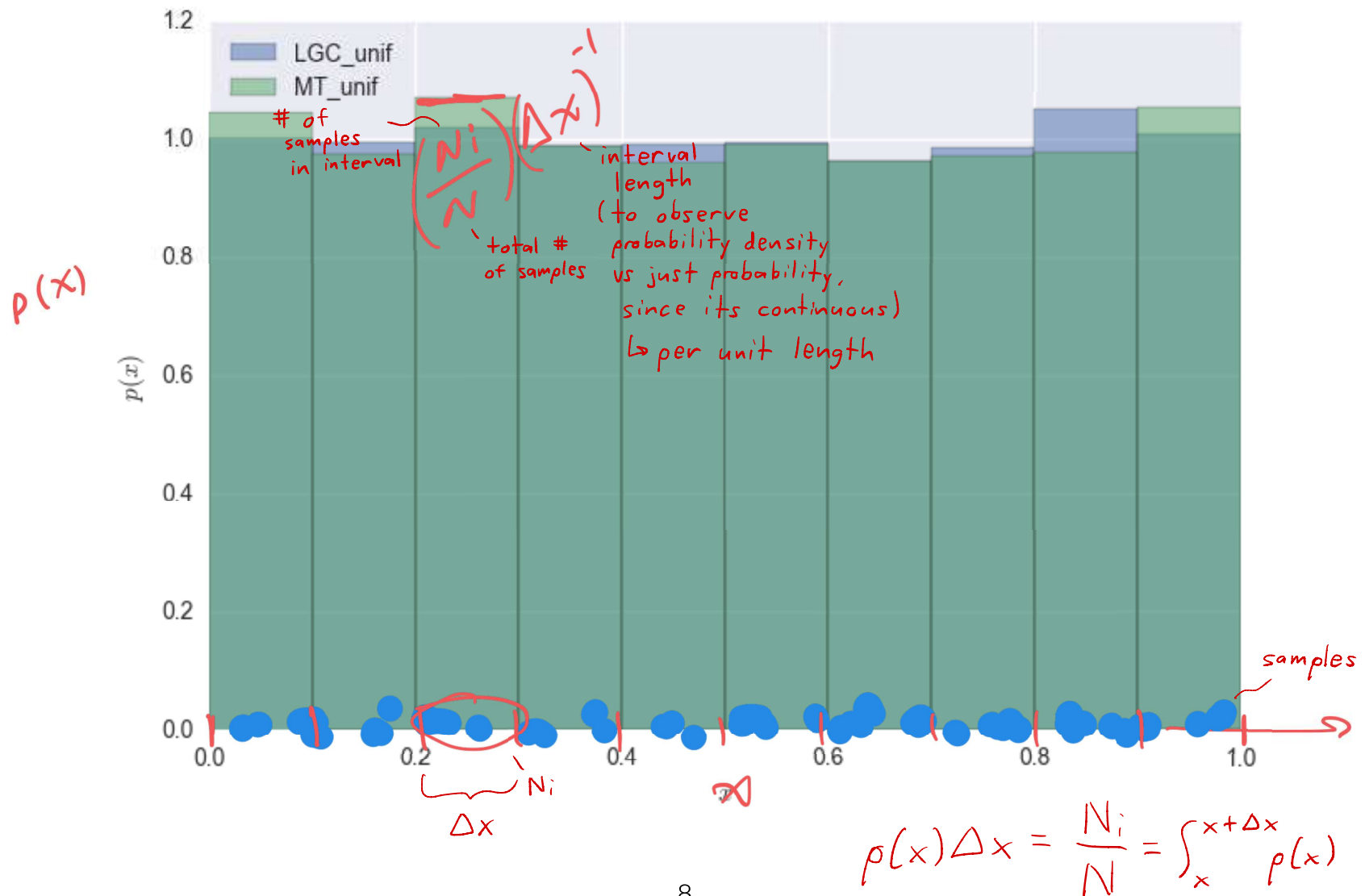
PRNG to uniform

- PRNG's generate random integers from 0 to m.
- How can we get samples from the uniform?
- Step 1: Sample a random integer d.
- Step 2: Set:

$$x = \frac{d}{m} \in [0, 1]$$

sample
maximum value

PRNG to Uniform



How do we know that the samples are indeed uniform?

$$X \sim U([a, b])$$

$$p(x) = \begin{cases} \frac{1}{b-a}, & x \in [a, b] \\ 0, & \text{otherwise} \end{cases} \quad \text{recall}$$

$$X \sim U([0, 1])$$

$$F(x) = P[X \leq x] = x$$

We can compare the empirical CDF with the ideal CDF.

$$\hat{F}_N(x)$$

samples

But what is the empirical CDF of a bunch of samples $x_{1:N}$?

It is defined as follows:

$$\star \hat{F}_N(x) = \frac{\text{number of elements in sample} \leq \underline{x}}{\underline{N} \text{ total \# of samples}}$$

How do we know that the samples are indeed uniform?

