

Inverse CDF sampling is a method for obtaining samples from both discrete and continuous probability distributions that requires the CDF to be invertible. The method proposes a CDF value from a Uniform random variable on  $[0, 1]$  which is then used as input into the inverted CDF to generate a sample with the desired discrete or continuous distribution. Here examples for both cases are discussed. For the continuous case a proof is given that demonstrates the samples produced have the expected distribution.

### Sampling Discrete Distributions

A discrete probability distribution consisting of a finite set of  $N$  probability values is defined by,

$$p = \{p_1, p_2, \dots, p_N\}$$

$$\sum_{i=1}^N p_i = 1$$

The CDF specifies the probability that  $i \leq n$  and is given by,

$$P(n) = \sum_{i=1}^n p_i, \tag{1}$$

where  $P(N) = 1$ .

Consider the following discrete distribution,

$$p = \left\{ \frac{1}{12}, \frac{1}{12}, \frac{1}{6}, \frac{1}{6}, \frac{1}{12}, \frac{5}{12} \right\} \tag{2}$$