

Method	$P(Y < l) = \int P(Y < l x) f(x) dx$	Remarks
Empirical bin-wise CDF	$\sum_i \frac{1}{N_i} \sum_k I(Y_{i,k} < l) f(x_i) \Delta x_i$	$P(Y < l x_i) \sim \frac{1}{N_i} \sum_k I(Y_{i,k} < l)$
Extrapolation	$\sum F_i(l) f(x_i) \Delta x_i$	$P(Y < l x_i) \sim F_i(l)$, fitted to above
Importance sampling	$\frac{1}{M_{\text{tot}}} \sum_{i,k} I(Y_{i,k} < l) \frac{f(x_i)}{g(x_i)}$	sampling from $g(x_i) = \frac{N_i}{N_{\text{tot}}} \frac{1}{\Delta x_i}$