Algorithm 1 Batched randomized QMC-IPA with jackknifing

Input: batch size m, the number of batches k, quantile α, Sobol sequence x, uniform random number y.

for $j = 1 \to k$ **do**
  for $i = 1 \to m$ **do**
    Let $U_i = x_i + y_i \bmod 1$
    Generate normal variable Z_i from U_i
    Let $h_i = h(Z_i(\theta), \theta)$
  end for
  Divide h_i into two groups h_i^d(d=1,2)
  Sort h_i, h_i^d(d=1,2) to get $h_{(1)}, h_{(2)}, ..., h_{(\lceil \alpha m \rceil)}, ..., h_{(m)}$ and $h^d_{(1)}, h^d_{(2)}, ..., h^d_{(\lceil \alpha m \rceil)}, ..., h^d_{(\lceil m/2 \rceil)}$
  Let $\tilde{I}_{m,j} \triangleq dh_{(\lceil \boldsymbol{\alpha} m \rceil)}(\theta)/d\theta$
  Let $\tilde{I}^1_{m,j} \triangleq dh^1_{(\lceil \boldsymbol{\alpha} m/2 \rceil)}(\theta)/d\theta$
  Let $\tilde{I}^2_{m,j} \triangleq dh^2_{(\lceil \boldsymbol{\alpha} m/2 \rceil)}(\theta)/d\theta$
  Let $\tilde{J}_{m,j} = 2\tilde{I}_{m,j} - 1/2(\tilde{I}^1_{m,j} + \tilde{I}^2_{m,j})$
end for

Output: Return the batched randomized QMC-IPA estimator with jackknifing

$$\bar{q}'_{\boldsymbol{\alpha}}(\theta) \triangleq 1/k \sum_{j=1}^{k} \tilde{J}_{m,j}$$